# DOCUMENT 00005

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RIO HONDO COLLEGE
FITNESS CENTER MECHANICAL UPGRADE PROJECT

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END OF SECTION
SECTION 00010

NOTICE TO CONTRACTORS CALLING FOR BIDS

DISTRICT: RIO HONDO COMMUNITY COLLEGE DISTRICT

PROJECT IDENTIFICATION: Fitness Center Mechanical Upgrade Project

PROJECT NO: Bid No. 2030

BIDS DUE BY: April 22, 2014 at 10:00 AM

SUBMIT BIDS TO: Rio Hondo Community College District
3600 Workman Mill Road, Room A-103
Whittier, California 90601
Telephone (562) 908-3413
Facsimile (562) 908-3462
Timothy Connell
Director, Contract Management and Vendor Services

BID AND CONTRACT DOCUMENTS AVAILABLE: On line at: http://www.riohondo.edu or at the mandatory bidder’s conference and job walk.

MANDATORY PRE-BID JOB WALK LOCATION: Rio Hondo College, PE Gymnasium, 3600 Workman Mill Rd., Whittier, CA 90601

JOB WALK DATE/TIME: April 7, 2014 at 12:00 PM

NOTICE IS HEREBY GIVEN that Rio Hondo Community College District, acting by and through its Board of Trustees, hereinafter the “District” will receive up to, but not later than the above-stated date and time, sealed Bid Proposals for the Contract for the Work generally described as: REPLACEMENT RETAINING WALL PROJECT

1.01 Submittal of Bid Proposals. All Bid Proposals shall be submitted on forms furnished by the District. Bid Proposals must conform with, and be responsive to, the Bid and Contract Documents, copies of which may be obtained from the District as set forth above. Only Bid Proposals submitted to the District prior to the date and time set forth above for the public opening and reading of Bid Proposals shall be considered.
1.02 **Bid and Contract Documents.** Bidder may obtain, at Bidder’s sole cost and expense, the Bid and Contract Documents at the location stated above.

1.03 **Bid Proposal.** Each Bid Proposal shall consist of:
   A. Bid Proposal
   B. Bid Security
   C. List of Subcontractors
   D. Non-Collusion Affidavit

All information or responses of a Bidder in its Bid Proposal and other documents accompanying the Bid Proposal shall be complete, accurate and true; incomplete, inaccurate or untrue responses or information provided therein by a Bidder may be grounds for the District to reject such Bidder’s Bid Proposal for non-responsiveness.

1.04 **Job-Walk.** The District will conduct a **ONE TIME ONLY MANDATORY PRE-BID JOB WALK** for the Work to be held at the location, date and time stated above. It is mandatory for the Prime contractor to attend the job-walk.

1.05 **Prevailing Wage Rates.** The Project is subject to the provisions of Labor Code §§1720 *et seq.* and regulations set forth in Title 8 §§16000 *et seq.* of the California Code of Regulations which govern the payment of prevailing wages on public works projects. All bidders shall be governed by and required to comply with these statutes and regulations in connection with the Project. Pursuant to Labor Code §1771, the Contractor receiving award of the Contract and Subcontractors of any tier shall pay not less than the prevailing wage rates to all workers employed in the execution of the Contract. Pursuant to Labor Code §1773, the Director of the Department of Industrial Relations has determined the generally prevailing rates of wages in the locality in which the Work is to be performed. Copies of these determinations, entitled “PREVAILING WAGE SCALE”, are maintained at the District’s offices located at 3600 Workman Mill Road, Whittier, CA 90601, and are available to any interested party upon request. Copies of rate schedules are also available on the Internet at [http://www.dir.ca.gov/DIR/S&R/statistics_research.html](http://www.dir.ca.gov/DIR/S&R/statistics_research.html). The Contractor awarded the Contract for the Work shall post a copy of all applicable prevailing wage rates for the Work at conspicuous locations at the Site of the Work.

1.06 **Contractors License Classification.** In accordance with the provisions of California Public Contract Code §3300, the District requires that Bidders possess a valid and Current Class B California Contractors License at the time that the bid for the work is submitted.

1.07 **Contract Time.** Substantial Completion of the Work shall be achieved within **SEVENTY NINE (79) CALENDAR DAYS** after the date for commencement of the Work as set forth in the Notice to Proceed issued by the District. Failure to achieve
Substantial Completion within the Contract Time will result in the assessment of Liquidated Damages.

1.08 **Bid Security.** Each Bid Proposal shall be accompanied by Bid Security in an amount not less than TEN PERCENT (10%) of the maximum amount of the Bid Proposal, inclusive of any additive Alternate Bid Item(s). Failure of any Bid Proposal to be accompanied by Bid Security in the form and in the amount required shall render such Bid Proposal to be non-responsive and rejected by the District.

1.09 **No Withdrawal of Bid Proposals.** No Bidder shall withdraw its Bid Proposal for a period of Ninety (90) days after the award of the Contract by the District’s Board of Trustees. During this time, all Bidders shall guarantee prices quoted in their respective Bid Proposals.

1.10 **Substitute Security.** In accordance with the provisions of California Public Contract Code §22300, substitution of eligible and equivalent securities for any monies withheld by the District to ensure the Contractor’s performance under the Contract will be permitted at the request and expense of the Contractor. The foregoing notwithstanding, the Bidder to whom the Contract is awarded shall have thirty (30) days following action by the District’s Board of Trustees to award the Contract to such Bidder to submit its written request to the District to permit the substitution of securities for retention. The failure of the Bidder to make such written request to the District within said thirty (30) day period shall be deemed a waiver of the Bidder’s rights under California Public Contract Code §22300.

1.11 **Waiver of Irregularities.** The District reserves the right to reject any or all Bid Proposals or to waive any irregularities or informalities in any Bid Proposal or in the bidding.

1.12 **Award of Contract.** The Contract for the Work, if awarded, will be by action of the District’s Board of Trustees to the responsible Bidder submitting the lowest responsive Bid Proposal. If the Bid Proposal requires Bidders to propose prices for Alternate Bid Items, the District’s selection of Alternate Bid Items, if any, for determination of the lowest priced Bid Proposal and for inclusion in the scope of the Contract to be awarded shall be in accordance with this Notice and the Instructions for Bidders.

1.13 **Inquiries and Clarifications.** This document is for informational purposes and shall not relieve the Bidder of the requirements to fully familiarize itself with all the factors affecting the Project and his Bid. The Bidder is advised that all inquiries and clarifications about the Bid Documents, Drawings, Specifications, etc., shall be submitted to the District in writing on or before 1:00 PM- April 10, 2014. The District will respond at its earliest possible opportunity but no later than April 14, 2014. Verbal communication by either party with regard to this matter is invalid. Inquiries shall be sent to:
1.14 Delivery. It is the bidder’s responsibility to deliver their bid prior to the time stated for opening of bids. The bidder should plan their delivery schedule to arrive early taking into consideration accident, breakdown, freeway congestion, traffic delays, check-in at the parking control booth, parking, etc. The District will not consider or take into account any excuse by the bidder for delivery of its bid after the time stated for the bid opening. Late bids will be returned to the bidder unopened.
SECTION 00100

INSTRUCTIONS FOR BIDDERS

1.01 Preparation and Submittal of Bid Proposal.

A. **Bid Proposal Preparation.** All information required by the bid forms must be completely and accurately provided. Numbers shall be stated in both words and figures where so indicated in the bid forms; conflicts between a number stated in words and in figures are governed by the words, except where the figures represent an express, correctly calculated sum. Partially completed Bid Proposals may be deemed non-responsive. Bid Proposals submitted on other than the bid forms included herein shall be deemed non-responsive. Bid Proposals not conforming to these Instructions for Bidders and the Notice to Contractors Calling for Bids (“Call for Bids”) may be deemed non-responsive and rejected. Each Bidder is solely responsible for all costs and expenses incurred by the Bidder in preparing and submitting a Bid Proposal to the District.

B. **Bid Proposal Submittal.** Bid Proposals shall be submitted at the place designated in the Call for Bids in sealed envelopes bearing on the outside the Bidder’s name and address along with an identification of the Work for which the Bid Proposal is submitted. Bidders are solely responsible for timely submission of Bid Proposals to the District at the place designated in the Call for Bids.

C. **Date and Time of Bid Proposal Submittal.** A Bid Proposal is considered submitted only if the outer envelope containing the Bid Proposal is stamped by the District’s date/time stamp machine at the place designated for submittal of the Bid Proposal. The date/time stamp is controlling and determinative as to the date and time of the Bidder’s submittal of its Bid Proposal. Bid Proposals received after the date and time specified in the Call for Bids are non-responsive and will be returned to the Bidder unopened.

D. **Alternate Bid Item(s).** If the Bid Proposal forms do not specifically call for the submittal of alternate bid item(s) and a Bidder submits alternate bid item(s), the District may deem the Bid Proposal to be non-responsive and reject the same. In the event that alternate item(s) are specifically called for in the Bid Proposal forms, any Bid Proposal which does not include bid(s) for the alternate item(s) may result in the Bid Proposal being deemed by the District to be non-responsive and rejected. In the event that bids for alternate item(s) are specifically called for in the Bid Proposal forms, the Bidder is referenced to the provisions of the Contract Documents permitting the District, during performance of the Work of
the Contract Documents, to add or delete such alternate item(s) with the cost or credit (inclusive of all direct and indirect costs, supervision, overhead and profit) for such alternate item(s) to be in the amount(s) set forth in the Bidder’s Bid Proposal for such alternate item(s).

1.02 **Bid Security.** Bid Security shall be in the form of: (a) cash, (b) a certified or cashier’s check made payable to the District or (c) a Bid Bond, in the form and content attached hereto, in favor of the District executed by the Bidder as a principal and an Admitted Surety Insurer under Code of Civil Procedure §§995.120 and 995.311 as surety (the “Bid Security”) in an amount not less than the percentage of the maximum amount of the Bid Proposal. Any Bid Proposal submitted without the required Bid Security is non-responsive and will be rejected.

1.03 **Signatures.** All bid forms shall be executed by an individual duly authorized to execute the same on behalf of the Bidder.

1.04 **Owner Controlled Insurance Program (“OCIP”).** In accordance with the provisions of Government Code §4420.5, Labor Code §§6300, et seq. and Title 8 of the California Code of Regulations, the District has implemented an “Owner Controlled Insurance Program” for the Project as more particularly set forth herein and in the Contract Documents. In accordance with the District’s OCIP for the Project, the District shall purchase, provide and maintain for the benefit of the Contractor, its Subcontractors and Sub-Subcontractors, certain insurance for Workers’ Compensation/Employer’s Liability, General Liability, Excess Liability and Builder’s Risk Insurance for the Project as more particularly set forth in the Contract Documents, including but not limited to Article 6 of the Contract General Conditions, Special Conditions and OCIP Project Manual, and subject to the terms and conditions thereof. Notwithstanding the OCIP Insurance provided by the District, the Contractor, its Subcontractors, Sub-Subcontractors and others shall purchase, provide and maintain certain other insurance not provided under the District’s OCIP as set forth in the Contract Documents, including but not limited to Article 6 of the General Conditions and the Special Conditions.

A. **Responsive Bid Proposal: OCIP Requirements.** In order to be considered a responsive Bid Proposal, a Bidder must demonstrate as set forth herein that the District’s Minimum Safety Requirements are met.

B. **Minimum Safety Requirements.** Pursuant to Government Code §4420.5, the District has established the following minimum safety requirements (“Minimum Safety Requirements”) for the Contractor and those Subcontractors subject to the provisions of Public Contract Code §§ 4100, et seq. (“Listed Subcontractors”), as more particularly set forth herein:

1. No willful violations of any occupational safety or health standard, order
or section 25910 of the Health and Safety Code.

2. No more than five (5) serious violations within the past five (5) years with no more than two (2) serious repeat violations of any occupational safety or health standard, order or section 25910 of the Health and Safety Code within the past five (5) years.

3. A Workers’ Compensation Experience Modification Factor of no more than 1.25 composite project average measured over a five (5) year history.

4. A current Injury and Illness Prevention Program instituted in accordance with the provisions of Labor Code §3201.5 or §6401.7. In the event that the Bidder or a Listed Subcontractor cannot provide a current Injury and Illness Prevention Program instituted in accordance with the provisions of Labor Code §3201.5 or §6401.7, such Bidder or Listed Subcontractor may elect to adopt the District’s Injury and Illness Prevention Program for purposes of this Bid.

C. Bidder’s and Listed Subcontractors’ Minimum Safety Requirements. The Bidder must meet the Minimum Safety Requirements. In addition, in order to be considered a responsive Bid Proposal, the Bidder must establish that Listed Subcontractors totaling at least sixty-five percent (65%) of the Bidder’s total Bid Amount, inclusive of all additive alternates but exclusive of hazardous materials abatement costs, meet or exceed the Minimum Safety Requirements.

1. **Submission of Information re: Minimum Safety Requirements.** By 4:00 p.m. of the next working day following the public opening and reading of Bid Proposals, the District shall notify the Bidders submitting the three (3) lowest Bid Proposals to submit to the District the California Contractor’s State License Number and dollar value of the work of each and every Listed Subcontractor. Failure of any of the three lowest Bidders to submit this information to the District within the time prescribed may result in the District’s rejection of the Bid Proposal of such bidder as non-responsive. The District reserves the right to request additional information of any of the three lowest bidders regarding compliance with the Minimum Safety Requirements. In addition, the District may, at its discretion, request that Bidders other than the three lowest bidders submit documentation of compliance with the Minimum Safety Requirements at any time after the District’s opening of Bid Proposals and prior to the District’s award of the Contract.

2. **District Confirmation of Minimum Safety Requirements.** The District shall cause a search to be made of applicable government agency
databases, including but not limited to the FedOSHA Statistical Database for Serious and Willful Violations and the California Department of Labor Database for Workers’ Compensation Experience Modification Factors, to determine whether the Bidder and the required number of Listed Subcontractors meet the Minimum Safety Requirements.

1.05 **Modifications.** Changes to the Bid Proposal which are not specifically called for or permitted may result in the District’s rejection of the Bid Proposal as being non-responsive. No oral or telephonic modification of any submitted Bid Proposal will be considered. A written modification may be considered only if actually received by the District ten (10) days prior to the scheduled closing time for receipt of Bid Proposals.

1.06 **Erasures; Inconsistent or Illegible Bid Proposals.** Bid Proposals must not contain any erasures, interlineations or other corrections unless the same are suitably authenticated by affixing in the margin immediately opposite such erasure, interlineation or correction the surname(s) of the person(s) signing the Bid Proposal. Any Bid Proposal not conforming to the foregoing may be deemed by the District to be non-responsive. If any Bid Proposal, or portions thereof, is determined by the District to be illegible, ambiguous or inconsistent, the District may reject such a Bid Proposal as being non-responsive.

1.07 **Examination of Site and Contract Documents.** Each Bidder shall, at its sole cost and expense, inspect the Site to become fully acquainted with the Contract Documents and conditions affecting the Work. The failure of a Bidder to receive or examine any of the Contract Documents or to inspect the Site shall not relieve such Bidder from any obligation with respect to the Bid Proposal, the Contract or the Work required under the Contract Documents. The District assumes no responsibility or liability to any Bidder for, nor shall the District be bound by, any understandings, representations or agreements of the District’s agents, employees or officers concerning the Contract Documents or the Work made prior to execution of the Contract. The submission of a Bid Proposal shall be deemed prima facie evidence of the Bidder’s full compliance with the requirements of this section.

1.08 **Withdrawal of Bid Proposal.** Any Bidder may withdraw its Bid Proposal without penalty by written request received by the District prior to the scheduled closing time for the receipt of Bid Proposals. Requests for withdrawal of bid proposals after scheduled closing time shall be in accordance with Public Contract Code §§5100 et seq.

1.09 **Documents Required Upon Award of Contract.** The Agreement which the successful Bidder, as Contractor, will be required to execute along with the other documents which will be required to be furnished are included in the Contract Documents and shall be carefully examined by the Bidder.
1.10 Interpretation of Drawings, Specifications or Contract Documents. Any Bidder in doubt as to the true meaning of any part of the Contract Documents or who finds discrepancies, errors or omissions therein; or who finds variances in any of the Contract Documents with applicable rules, regulations, ordinances and/or laws, may submit to the District a written request for an interpretation or correction thereof. It is the sole and exclusive responsibility of the Bidder to submit such request not less than seven (7) days prior to the scheduled closing for the receipt of Bid Proposals. Interpretations or corrections of the Contract Documents will be by written addendum issued by the District, a copy of which will be sent to each Bidder who attends the mandatory pre-bid job walk. No person is authorized to render an oral interpretation or correction of any portion of the Contract Documents to any Bidder, and no Bidder is authorized to rely on any such oral interpretation or correction. Failure to request interpretation or clarification of any portion of the Contract Documents pursuant to the foregoing is a waiver of any discrepancy, defect or conflict therein.

1.11 Request for Substitutions Prior to Bid Opening. Any Bidder may submit Request(s) for Substitution on the form provided herein, together with all substantiating data, no later than fourteen (14) days prior to the scheduled closing time for receipt of the Bid Proposals, in accordance with Public Contract Code §3400. The District shall use its best efforts to consider and act upon such Request for Substitution in a timely fashion. Actions taken, if any, concerning the Request for Substitution will be by written addendum issued by the District, a copy of which will be sent to each Bidder who attends the mandatory pre-bid job walk. In the absence of written addendum, the Request for Substitution shall be deemed denied for purposes of the District’s evaluation of the Bid Proposals and award of the Contract.

1.12 District’s Right to Modify Contract Documents. Before the scheduled closing time for receipt of Bid Proposals, the District may modify the Work, the Contract Documents, or any portion(s) thereof by the issuance of written addenda disseminated to all Bidders who have attended the mandatory pre-bid job walk. If the District issues any addenda, the failure of any Bidder to acknowledge such addenda in its Bid Proposal may render the Bid Proposal non-responsive.

1.13 Bidders Interested in More Than One Bid Proposal. No person, firm, corporation or other entity shall submit or be interested in more than one Bid Proposal for the same Work; provided, however, that a person, firm or corporation that has submitted a sub-proposal to a Bidder or who has quoted prices for materials to a Bidder is not thereby disqualified from submitting a sub-proposal, quoting prices to other Bidders or submitting a Bid Proposal for the proposed Work to the District.
1.14 Award of Contract

A. **Waiver of Irregularities or Informalities.** The District reserves the right to reject any and all Bid Proposals or to waive any irregularities or informalities in any Bid Proposal or in the bidding.

B. **Award to Lowest Responsive Responsible Bidder.** The award of the Contract, if any, will be to the responsible Bidder submitting the lowest responsive Bid Proposal on the basis of the Base Bid Proposal.

C. **Selection of Alternate Bid Items; Basis of Award of Contract.** The selection of Bid Alternates for determination of the lowest Bid Proposal will be based upon the Base Bid Proposal alone or a combination of the Base Bid Proposal and one or more Bid Alternates as selected by the District in accordance with the following “blind bidding” procedures. After opening timely submitted Bid Proposals and before the public reading of the Bid Proposals, District staff who will not be engaged in the selection of Bid Alternates (“Clerical Staff”) will assign each Bidder an alphabetical letter for identification purposes. The Clerical Staff will mask all portions of the Bid Proposal and other documents submitted with Bid Proposals so that the identity of each Bidder and each listed subcontractor is not revealed. The Clerical Staff will maintain a list (“Bidders List”) which identifies each Bidder’s name and a corresponding alphabetical letter assigned to each Bidder. After completing the Bidders List, the Clerical Staff will publicly read the Bid Proposal amounts of each Bidder for the Base Bid as well as each Bid Alternate. In this public reading, Bidders will not be identified by name, only by alphabetical letter assigned to each Bidder. After the public reading of Bid Proposals, the Clerical Staff will provide the Project Manager, Architect and District staff responsible for selection of Bid Alternates (“Review Team”) copies of the Bid Proposals with the identities of Bidders and listed subcontractors masked. Bid Proposals reviewed by the Review Team will identify Bidders only by alphabetical letters. At such time as the Review Team has completed its review of the Bid Proposals, has selected Bid Alternates and has determined which Bidder (by the alphabetical letter designation assigned by Clerical Staff) has submitted the lowest Bid Proposal based upon the Base Bid and any combination of the Bid Alternates as determined by the Review Team, the Clerical Staff will make available to the Review Team the Bidders List so that the identity of the Bidder to be awarded the Contract can be identified. Until such time as the Review Team has completed review of Bid Proposals and determination of which Bidder has submitted the lowest responsive Bid Proposal, there will be no communication between members of the Clerical Staff and members of the Review Team regarding the identities of Bidders or listed subcontractors or any disclosure of any portion of the Bidders List.
D. **Alternate Bid Items Not Included in Award of Contract.** During performance of the Work, it is the District’s option to add or delete from the scope of the Work Alternate Bid Items that were not included in the award of Contract. District may elect to have work done at price(s) set forth in the Alternate Bid Items Proposal.

E. **Responsive Bid Proposal.** A responsive Bid Proposal shall mean a Bid Proposal which conforms, in all material respects, to the Bid and Contract Documents.

F. **Responsible Bidder.** A responsibleBidder is a Bidder who has the capability in all respects to perform fully the requirements of the Contract Documents and the moral and business integrity and reliability that will assure good faith performance. In determining responsibility, the following criteria will be considered: (i) the ability, capacity and skill of the Bidder to perform the Work of the Contract Documents; (ii) whether the Bidder can perform the Work promptly and within the time specified, without delay or interference; (iii) the character, integrity, reputation, judgment, experience and efficiency of the Bidder; (iv) the quality of performance of the Bidder on previous contracts, by way of example only, the following information will be considered: (a) the administrative, consultant or other cost overruns incurred by the District on previous contracts with the Bidder; (b) the Bidder's compliance record with contract general conditions on other projects; (c) the submittal by the Bidder of excessive and/or unsubstantiated extra cost proposals and claims on other projects; (d) the Bidder's record for completion of work within the contract time and the Bidder's compliance with the scheduling and coordination requirements on other projects; (e) the Bidder's demonstrated cooperation with the District and other contractors on previous contracts; (f) whether the work performed and materials furnished on previous contracts was in accordance with the Contract Documents; (v) the previous and existing compliance by the Bidder with laws and ordinances relating to contracts; (vi) the sufficiency of the financial resources and ability of the Bidder to perform the work of the Contract Documents; (vii) the quality, availability and adaptability of the goods or services to the particular use required; (viii) the ability of the Bidder to provide future maintenance and service for the warranty period of the Contract; (ix) whether the Bidder is in arrears on debt or contract or is a defaulter on any surety bond; (x) such other information as may be secured by the District having a bearing on the decision to award the Contract, to include without limitation the ability, experience and commitment of the Bidder to properly and reasonably plan, schedule, coordinate and execute the Work of the Contract Documents and whether the Bidder has ever been debarred from bidding or found ineligible for bidding on any other projects. The ability of a Bidder to provide the required bonds will not of itself demonstrate responsibility of the Bidder. Upon request of the District, Bidder must promptly submit satisfactory evidence of any of the items listed above.
1.15 Subcontractors

A. Designation of Subcontractors; Subcontractors List. Each Bidder shall submit a list of its proposed Subcontractors for the proposed Work as required by the Subletting and Subcontracting Fair Practices Act (California Public Contract Code §§4100 et seq.) on the form furnished (Section 00215). Any Bidder’s failure to comply with the District’s request may render such Bidder's bid non-responsive and subject to rejection by the District.

B. Work of Subcontractors. The organization or arrangements of the Specifications and Drawings shall not limit the extent of the Work of the Contract Documents. Accordingly, all Bidders are encouraged to disseminate all of the Specifications, Drawings and other Contract Documents to all persons or entities submitting sub-bids to the Bidder. The omission of any portion or item of Work from the Bid Proposal or from the sub-bidders’ sub-bids is not a basis for adjustment of the Contract Price or the Contract Time.

1.16 Workers’ Compensation Insurance. Pursuant to California Labor Code §3700, the successful Bidder shall secure Workers' Compensation Insurance for its employees engaged in the Work of the Contract. The successful bidder shall sign and deliver to the District the Workers Compensation Insurance certificate provided in Section 00415 prior to performing any of the Work under the Contract.

1.17 Bid Security Return. The Bid Security of three or more low Bidders, the number being solely at the discretion of the District, will be held by the District for ten (10) days after the period for which Bid Proposals must be held open (which is set forth in the Call for Bids) or until posting by the successful Bidder(s) of the bonds, certificates of insurance required and return of executed copies of the Agreement, whichever first occurs, at which time the Bid Security will be returned to them.

1.18 Forfeiture of Bid Security. If the Bidder awarded the Contract fails or refuses to execute the Agreement within seven (7) days from the date of receiving notification that it is the Bidder to whom the Contract has been awarded, the District may declare the Bidder's Bid Security forfeited as damages caused by the failure of the Bidder to enter into the Contract and may thereupon award the Contract for the Work to the responsible Bidder submitting the next lowest responsive Bid Proposal or may call for new bids, in District’s sole and exclusive discretion.

1.19 Contractor’s License. No Bid Proposal will be considered from a Bidder who, at the time Bid Proposals are opened, is not licensed to perform the Work of the Contract Documents, in accordance with the Contractors License Law, California Business & Professions Code §§7000 et seq. This requirement is not a mere formality and cannot be waived by the District or its Board of Trustees. The required California Contractor's
License classification(s) for the Work is set forth in the Call for Bids. The Contractor will be required to maintain the license(s) through the duration of the Contract. Any questions concerning a Contractor may be referred to the Registrar, Contractors’ State License Board, P.O. Box 2600, Sacramento, CA 95826.

1.20 Anti-Discrimination. It is the policy of the District that there be no discrimination against any prospective or active employee engaged in the Work because of race, color, ancestry, national origin, religious creed, sex, age or marital status. All Bidders agree to comply with the District’s anti-discrimination policy and all applicable Federal and California anti-discrimination laws including but not limited to the California Fair Employment & Housing Act beginning with California Government Code §§12940 et seq. and California Labor Code §1735. In addition, all Bidders agree to require like compliance by any Subcontractor employed by them on the Work of the Contract.

1.21 Job-Walk.

A. **District Conduct of Job-Walk.** The District will conduct a Job Walk at the time and place designated in the Call for Bids. Regardless of whether the Job Walk is or is not designated as being mandatory, the District may, in its sole and exclusive discretion, elect to conduct one or more Job Walks in addition to that set forth in the Call for Bids, in which event the District shall notify all Bidders who have obtained the Contract Documents pursuant to the Call for Bids of any such additional Job Walk. If the District elects to conduct any Job Walk in addition to that set forth in the Call for Bids, the District shall, in its notice of any such additional Job Walks, indicate whether Bidders’ attendance at such additional Job Walks is mandatory; in the event that any such additional Job Walks is mandatory, the provisions of this section 1.22 shall be deemed to apply to such additional Job Walks.

B. **Mandatory Job Walk.** If the Job Walk is designated in the Call for Bids as being mandatory, the failure of any Bidder to have its authorized representative present at the Job Walk will be grounds for the District to reject such bid and the Bid Proposal will be returned to the Bidder unopened. Where the Job Walk is mandatory, a Bidder may have more than one authorized representative and/or representatives of its Subcontractors present at the Job Walk; provided, however that attendance by representatives of the Bidder's Subcontractors without attendance by a representative of the Bidder shall not be sufficient to meet the Bidder's obligations hereunder and will be grounds for the District to declare the Bid Proposal of such Bidder to be non-responsive. Notwithstanding any other provisions of the Call for Bids or these Instructions for Bidders, in the event that the Job Walk is designated in the Call for Bids as being mandatory, the District will not consider the Bid Proposal of any Bidder who has obtained the Bid and Contract Documents, pursuant to Call for Bids, after the date and time set forth
therein for such mandatory Job Walk; any Bid Proposal submitted by any such Bidder shall be deemed non-responsive, rejected and returned unopened to the Bidder submitting the same.

1.22 **Drug Free Workplace Certificate.** In accordance with California Government Code §§8350 et seq., the Drug Free Workplace Act of 1990, the successful Bidder will be required to execute a Drug Free Workplace Certificate concurrently with execution of the Agreement. The successful Bidder will be required to implement and take the affirmative measures outlined in such provisions. Failure of the successful Bidder to comply with the measures outlined in such provisions may result in penalties, including without limitation, the termination of the Agreement, the suspension of any payment of the Contract Price otherwise due under the Contract Documents and/or debarment of the successful Bidder.

1.23 **Compliance with Immigration Reform and Control Act of 1986.** The Bidder is solely and exclusively responsible for employment of individuals for the Work of the Contract in conformity with the Immigration Reform and Control Act of 1986, 8 USC §§1101 et seq. (“IRCA”); the successful Bidder shall also require that any person or entity employing labor in connection with any of the Work of the Contract shall so similarly comply with the IRCA.

1.24 **Notice of Intent to Award Contract.** Following the public opening and reading of Bid Proposals, the District will issue a Notice of Intent to Award the Contract, identifying the Bidder to whom the District intends to award the Contract and the date/time/place of the District’s Board of Trustees meeting at which award of the Contract will be considered.

1.25 **Bid Protest.** Any Bidder submitting a Bid Proposal to the District may file a protest of the District’s intent to award the Contract provided that each and all of the following are complied with:

A. The bid protest is in writing;

B. The bid protest is filed and received by the District’s Vice President, Business not more than five (5) calendar days following the date of issuance of the District’s Notice of Intent to Award the Contract; and

C. The written bid protest sets forth, in detail, all grounds for the bid protest, including without limitation all facts, supporting documentation, legal authorities and argument in support of the grounds for the bid protest; any matters not set forth in the written bid protest shall be deemed waived. All factual contentions must be supported by competent, admissible and creditable evidence.

Any bid protest not conforming to the foregoing shall be rejected by the District as invalid. Provided that a bid protest is filed in strict conformity with the foregoing,
the District’s Vice President, Business or designee, shall review and evaluate the basis of the bid protest. The District’s Vice President, Business or designee shall provide the Bidder submitting the bid protest with a written statement concurring with or denying the bid protest. The District’s Board of Trustees will render a final determination and disposition of a bid protest by taking action to adopt, modify or reject the disposition of a bid protest as reflected in the written statement of the District’s Vice President, Business or designee. Action by the District’s Board of Trustees relative to a bid protest shall be final and not subject to appeal or reconsideration by the District, any employee or officer of the District or the District’s Board of Trustees. The issuance of a written statement by the Vice President, Business (or designee) and subsequent action by the District’s Board of Trustees shall be express conditions precedent to the institution of any legal or equitable proceedings relative to the bidding process, the District’s intent to award the Contract, the District’s disposition of any bid protest or the District’s decision to reject all Bid Proposals. In the event that any such legal or equitable proceedings are instituted and the District is named as a party thereto, the prevailing party(ies) shall recover from the other party(ies), as costs, all attorneys’ fees and costs incurred in connection with any such proceeding, including any appeal arising therefrom.

1.26 Public Records. All documents included in Bid Proposals become the exclusive property of the District upon submittal to the District. All Bid Proposals and other documents submitted in response to the Call for Bids become a matter of public record, except for information contained in such Bid Proposals deemed to be Trade Secrets (as defined in California Civil Code §3426.1). A Bidder that indiscriminately marks all or most of its Bid Proposal as exempt from disclosure as a public record, whether by the notations of “Trade Secret,” “Confidential,” “Proprietary,” or otherwise, may render the Bid Proposal non-responsive and rejected. The District is not liable or responsible for the disclosure of such records, including those exempt from disclosure if disclosure is deemed required by law, by an order of Court, or which occurs through inadvertence, mistake or negligence on the part of the District or its officers, employees or agents. At such time as Bid Proposals are deemed a matter of public record, pursuant to the above, any Bidder or other party shall be afforded access for inspection and/or copying of such Bid Proposals, by request made to the District in conformity with the California Access to Public Records Act, California Government Code §§6250, et. seq.

END OF SECTION
SECTION 00210

BID PROPOSAL

TO:  RIO HONDO COMMUNITY COLLEGE DISTRICT, a California Community College District, acting by and through its Board of Trustees (“District”), 3600 Workman Mill Road, Whittier, California 90601.

FROM: ____________________________________________

(Name of Bidder as listed on License)

__________________________________________

(Address)

__________________________________________

(City, State, Zip Code)

__________________________________________

(Telephone)

__________________________________________

(Fax)

(Name(s) of Bidder's Authorized Representative(s) & Title)

1.01 Bid Proposal.

A. Bid Proposal Amount. Pursuant to and in compliance with the Notice to Contractors Calling for Bids, the Instructions for Bidders and the other documents relating thereto, the undersigned Bidder, having reviewed the Instructions for Bidders and all other Contract Documents and upon compliance with all requirements therein with reference to the submittal of this Bid Proposal, hereby proposes and agrees to perform the Contract including, without limitation, all of its component parts; to perform everything required to be performed; to provide and furnish any and all of the labor, materials, tools, equipment, applicable taxes, and services necessary to perform the Work of the Contract in strict compliance with the Contract Documents and complete in a workmanlike manner all of the Work required for the Project described as:

FITNESS CENTER MECHANICAL UPGRADE PROJECT- in the Rio Hondo Community College, Whittier, CA.

for the sum of:

Total Bid Amount: $__________________________________________

(Total Bid Amount in Figures)

(Total Bid Amount in Words)
B. **Acknowledgment of OCIP Insurance Provided by District.** The undersigned Bidder acknowledges that, pursuant to the Contract Documents, the District has agreed to purchase, provide and maintain under the District’s Owner Controlled Insurance Program certain insurance for Workers’ Compensation/Employer’s Liability, General Liability, Excess Liability and Builder’s Risk Insurance for the benefit of the Contractor, Subcontractors and Sub Subcontractors for the Project at the District’s expense as more particularly set forth in the Contract Documents, including but not limited to Article 6 of the General Conditions and Special Conditions, and subject to all terms and conditions of the Contract Documents and OCIP Insurance Policies. The undersigned Bidder acknowledges and agrees that Bidder, in submitting this Bid Proposal, has taken into account the OCIP insurance provided for the Project at the District’s expense.

C. **Acknowledgment of Bid Addenda.** In submitting this Bid Proposal, the undersigned Bidder acknowledges receipt of all Bid Addenda issued by or on behalf of the District, as set forth below. The Bidder confirms that this Bid Proposal incorporates and is inclusive of, all items or other matters contained in Bid Addenda.

- ______ No Addenda Issued (initial)
- ______ Addenda Nos. _________________ received, acknowledged and (initial) incorporated into this Bid Proposal.

D. **Alternate Bid Items.** The Bidder’s price proposal(s) for Alternate Bid Items is/are set forth in the form of Alternate Bid Item Proposal included herewith. The Bidder acknowledges that the award of the Contract, if at all, shall be in accordance with the Instructions for Bidders.

1.02 **Rejection of Bid; Holding Open of Bid.** It is understood that the District reserves the right to reject this Bid Proposal and that this Bid Proposal shall remain open and not be withdrawn for the period of time specified in the Call for Bids, except as provided by law.

1.03 **Documents Comprising Bid Proposal.** The undersigned Bidder has submitted as its Bid Proposal the following: Bid Proposal (00210), List of Subcontractors (00215), Non-Collusion Affidavit (00220) and Bid Security (Cash, Cashier’s Check, Certified Check or Bid Bond – 00260). The Bidder acknowledges that if this Bid Proposal and the foregoing documents are not fully in compliance with applicable requirements set forth in the Call for Bids, the Instructions for Bidders and in each of the foregoing documents, the Bid Proposal may be rejected as non-responsive.

1.04 **Award of Contract.** It is understood and agreed that if written notice of the acceptance of this Bid Proposal and award of the Contract thereon is mailed or delivered by the
1.05 **Notices.** All notices or other correspondence shall be addressed to the District and the Bidder at their respective addresses set forth herein. Notices shall be effective only if in writing and in conformity with the requirements for service of notices set forth in the Contract Documents.

1.06 **Contractor's License.** The undersigned Bidder is currently and duly licensed in accordance with the California Contractors License Law, California Business & Professions Code §§7000 et seq., under the following:

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<th>License Number:</th>
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<th>Expiration Date</th>
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By executing this Bid Proposal, the Bidder hereby certifies that: (a) it is duly licensed, in the necessary class(es), for performing the Work of the Contract Documents; (b) that such license shall be in full force and effect throughout the duration of the performance of the Work under the Contract Documents; and (c) that all Subcontractors providing or performing any portion of the Work of the Contract Documents shall be so similarly and appropriately licensed to perform or provide such portion of the Work.

1.07 **Designation of Subcontractors.** In compliance with the Subletting and Subcontracting Fair Practices Act (California Public Contract Code §§4100, et seq.) and amendments thereof, each Bidder shall set forth in the Subcontractors List: (a) the name and location of the place of business of each Subcontractor who will perform work or labor or render services to the Bidder in or about the construction of the Work to be performed under the Contract Documents in an amount in excess of one-half of one percent (0.5%) of the Bidder's Bid Proposal; and (b) the trade and/or portion of the Work which will be
performed by each listed Subcontractor. The Bidder shall list only one Subcontractor for each trade and/or portion of the Work as is defined by the Bidder in its Bid Proposal. If a Bidder fails to list a Subcontractor for a portion of the work in excess of one-half of one percent (0.5%) of the Bidder’s Bid Proposal or if the Bidder specifies more than one Subcontractor for the same portion of Work to be performed under the Contract Documents valued in excess of one-half of one percent (0.5%) of the Bidder's Bid Proposal amount, the Bidder shall be deemed to have agreed that it is fully qualified to perform that portion of the Work itself and that it shall perform that portion of the Work.

1.08 Confirmation of Figures. By submitting this Bid Proposal, the Bidder confirms that it has checked all of the above figures and understands that neither the District nor any of its agents, employees or representatives shall be responsible for any errors or omissions on the part of the undersigned Bidder in preparing and submitting this Bid Proposal.

1.09 Acknowledgment and Confirmation. The undersigned Bidder acknowledges its receipt, review and understanding of the Drawings, the Specifications and other Contract Documents pertaining to the proposed Work. The undersigned Bidder certifies that the Contract Documents are, in its opinion, adequate, feasible and complete for providing, performing and constructing the Work in a sound and suitable manner for the use specified and intended by the Contract Documents. The undersigned Bidder certifies that it has, or has available, all necessary equipment, personnel, materials, facilities and technical and financial ability to complete the Work for the amount bid herein within the Contract Time and in accordance with the Contract Documents. The undersigned Bidder certifies that its bid amount includes funds sufficient to allow the Bidder to comply with all applicable local, state and federal laws and regulations governing the labor and services to be provided for the performance of the Work of the Contract and shall indemnify, defend and hold District harmless from and against any and all claims, demands, losses, liabilities and damages arising out of or relating to Bidder’s failure to comply with applicable law in this regard.

By: ________________________________
(Signature)

(Corporate Seal)

_________________________________
(Typed or Printed Name of Bidder’s Authorized Representative)

Title: ________________________________

END OF SECTION
### LIST OF SUBCONTRACTORS

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<th>1. Licensed Name of Subcontractor</th>
<th>2. Address of Office, Mill or Shop</th>
<th>3. Trade or Portion of Work</th>
<th>4. License No.</th>
<th>5. $$ Value of Work</th>
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Name of Bidder: ________________________________

Authorized Signature: __________________________

[Duplicate and attach additional page(s) as required.]

RIO HONDO COLLEGE
FITNESS CENTER MECHANICAL UPGRADE PROJECT
SECTION 00220

NON-COLLUSION AFFIDAVIT

STATE OF CALIFORNIA
COUNTY OF __________________________

I, __________________________ being first duly sworn, deposes and says that I
am the __________________________ of __________________________, the party
submitting the foregoing Bid Proposal (the “Bidder”). In connection with the foregoing Bid
Proposal, the undersigned declares, states and certifies that:

1.01 The Bid Proposal is not made in the interest of, or on behalf of, any undisclosed person,
partnership, company, association, organization or corporation.

1.02 The Bid Proposal is genuine and not collusive or sham.

1.03 The 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 other bidder or anyone else to put in sham bid, or to refrain from bidding.

1.04 The Bidder has not in any manner, directly or indirectly, sought by agreement,
communication, or conference with anyone to fix the bid price, or that of any other
bidder, or to fix any overhead, profit or cost element of the bid price or that of any other
bidder, or to secure any advantage against the public body awarding the contract or of
anyone interested in the proposed contract.

1.05 All statements contained in the Bid Proposal and related documents are true.

1.06 The Bidder has not, directly or indirectly, submitted the 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 person, corporation, partnership, company, association,
organization, bid depository, or to any member or agent thereof to effectuate a collusive
or sham bid.

Executed this _____ day of __________, 20____ at __________________________
(City, County and State)
I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

__________________________  ____________________________
Signature (Address)

__________________________  ____________________________
Name Printed or Typed (City, County and State)

(_____) (Area Code and Telephone Number)
SECTION 00240

STATEMENT OF BIDDER’S QUALIFICATIONS

1.01 Bidder’s Organization

A. Form of entity of Bidder, i.e., corporation, partnership, etc.

1. If a corporation, state the following:
   State of Incorporation: ___________________________
   Date of Incorporation: ___________________________
   President/Chief Executive Officer:_____________________
   Secretary: _______________________________________
   Treasurer/Chief Financial Officer:_____________________

2. If a partnership, state the following:
   Date of Organization: ___________________________
   Type of Partnership (general, limited): _______________
   Names of all general partners; if any of the general partners are not natural persons, provide the information for each such general partner requested by Paragraphs 1.01.A.1, 1.01.A.2 and 1.01.A.4 as appropriate: _______________

3. If a proprietorship, state the following:
   Names of all proprietors: ___________________________

4. If a joint venture, state the following:
   Date of organization: ___________________________
   Names of all Joint Venture members. For each Joint Venture member, identify the form of entity and provide the information requested by Paragraphs 1.01.A.1, 1.01.A.2 and 1.01.A.4 as appropriate: _______________

_________________________________________________
5. Bidder’s form of entity is other than listed above, describe the type of entity or organization and identify all principals or owners of equity in the entity or organization:

B. Number of years your organization has been in business as a contractor: _______

C. Number of years your organization has conducted business under its present name: _______

1. If your organization has conducted business under a name or name style different than your organization’s present name, identify all prior name(s) or name style(s):

B. Number of years your organization has conducted business under its present name: _______

1. If your organization has conducted business under a name or name style different than your organization’s present name, identify all prior name(s) or name style(s):

2. For each name or name style identified in Paragraph 1.01.C.1, state the dates during which you conducted business under each name or style: _____

1.02 Financial

A. Attach a current audited, reviewed or compiled Financial Statement for your organization prepared by a Certified Public Accountant licensed under the laws of the State of California utilizing generally accepted accounting practices applied in a consistent manner. The Financial Statement must include a current balance sheet and income statement showing: (i) current assets (i.e., cash, accounts receivable, accrued income, deposits, material inventory, etc.); (ii) net fixed assets; (iii) other assets; (iv) current liabilities (i.e., accounts payable, accrued salaries, accrued payroll taxes, etc.); and (v) other liabilities (i.e., capital, capital stock, earned surplus, retained earnings, etc.).

B. Is the attached Financial Statement for the identical organization as the Bidder? _____Yes _____No.

If not, explain the relationship and financial responsibility of the organization whose Financial Statement is provided (i.e., parent/subsidiary, etc.).
1.03 Licensing

A. California Contractors License:

   License Number: ________________________________
   Expiration Date: _______________________________
   Responsible Managing Employee/Officer: ____________
   License Classification(s): _______________________

B. Has a claim or other demand ever been made against your organization’s California Contractors License Bond? _____ Yes _____ No

   If yes, on a separate attachment, state the following: (i) the name, address and telephone number of each person or entity making claim or demand; (ii) the date of each claim or demand; (iii) the circumstances giving rise to each such claim or demand; and (iv) the disposition of each such claim or demand.

C. Has a complaint ever been filed against your organization’s California Contractors License with the California Contractors State License Board? _____ Yes _____ No

   If yes, on a separate attachment, state the following for each complaint: (i) the name, address and telephone number of each person or entity making the complaint; (ii) the date of each complaint; (iii) the circumstances giving rise to each such complaint; and (iv) the disposition of each such complaint, including without limitation, any disciplinary or other action imposed or taken by the California Contractors State License Board as a result of any such complaint.

D. Attach to this Statement true and correct copies of the following:

1. Your organization’s California Contractors License (the copy must clearly and legibly show: (i) the licensee name; (ii) the expiration date; (iii) the classification(s) of licensure).

2. The Contractors License Bond posted by your organization in connection with your California Contractors License pursuant to California Business & Professions Code §§7071.5 and 7071.6.

3. If your organization’s California Contractors License is issued by virtue of the qualification of a responsible managing employee or responsible managing officer, the Qualifiers Bond if required pursuant to California Business & Professions Code §7071.9).
1.04 Experience

A. List the categories of work your organization typically performs with your own forces:

B. Claims and lawsuits (if you answer yes to any of the following, you must attach details).

1. Have any lawsuits or other administrative, legal, arbitration or other proceedings, ever been brought or commenced against your organization or any of its principals, officers or equity owners in connection with any construction contract or construction project? _____ Yes _____ No

If so, describe the circumstances, the amount demanded or other relief demand and the disposition of each such lawsuit or other proceeding.

2. Has your organization ever filed a lawsuit or commenced other administrative, legal or other proceedings in connection with any construction contract or construction project? _____ Yes _____ No

If so, describe the circumstances, the amount demanded or other relief demand and the disposition of each such lawsuit or other proceeding.

3. Are there any judgments, orders, decrees or arbitration awards pending, outstanding against your organization or any of the officers, directors, employees or principals of your organization? _____ Yes _____ No

If so, describe each such judgment, order, decree or arbitration award and the present status of the satisfaction or discharge thereof.

C. On a separate attachment, list all construction projects your organization has in progress and for each project listed, state: (i) a general description of the work performed by your organization on the project; (ii) the dollar value of the work performed or to be performed by your organization; (iii) the owner’s name, name of the owner’s representative and the address and telephone number of the owner and the owner’s representative; (iv) the project architect’s name, address, telephone number and contact person; (v) percent presently complete; and (vi) the current scheduled completion date.

D. On a separate attachment, list all construction projects completed by your organization in the past five (5) years and for each project identified, state: (i) a
E. Has your organization ever refused to sign a contract awarded to it?  
_____Yes  _____No

If so, on a separate attachment, state the following: (i) describe each such contract; (ii) the owner’s name, address, telephone number and contact person; and (iii) the circumstances of your refusal to sign such contract.

F. Has your organization ever failed to complete a construction contract?  
_____Yes  _____No

If so, on a separate attachment, state the following: (i) describe each such contract; (ii) the owner’s name, address, telephone number and contact person; and (iii) the circumstances of your failure to complete such contract.

G. Has your organization ever been declared in default of a construction contract?  
_____Yes  _____No

If so, on a separate attachment, state the following: (i) describe each such contract; (ii) the owner’s name, address, telephone number and contact person; and (iii) the circumstances of each such declaration of default.

H. Has any construction contract to which your organization is a party been terminated for the convenience of the project owner?  _____Yes  _____No

If so, identify the project and project owner along with a description of the circumstances under which the convenience termination occurred.

I. Has a claim or other demand ever been asserted against any Bid Bond, Performance Bond, or Payment Bond posted by your organization in connection with any construction contract or your submittal of a bid proposal for a construction contract?  _____Yes  _____No

If so, on a separate attachment, state the following: (i) the name, address, telephone number and contact person for each claimant; (ii) the date upon which each such demand or claim was made; and (iii) the disposition of each such demand or claim.
1.05 References (include name, contact person, telephone/FAX and address for each reference provided)

A. Trade References (three (3) minimum)

B. Bank References

C. Public Works Inspectors of Record

D. Owner references (three (3) minimum, preferably California K-12 school districts and/or California community college districts)

E. Insurance Carriers (General Liability, Auto, and Workers’ Compensation)

F. Surety Firms (issuing your Bid, Performance and Payment Bonds)

1.06 Accuracy and Authority

The undersigned is duly authorized to execute this Statement of Bidders Qualifications.
under penalty of perjury on behalf of the Bidder. The undersigned warrants and represents that he/she has personal knowledge of each of the responses to this Statement of Bidder’s Qualifications and/or that he/she has conducted all necessary and appropriate inquiries to determine the truth, completeness and accuracy of responses to this Statement of Bidder’s Qualifications.

The undersigned declares and certifies that the responses to this Statement of Bidder’s Qualifications are complete and accurate; there are no omissions of material fact or information that render any response to be false or misleading and there are no misstatements of fact in any of the responses.

Executed this ______ day of _________, 20___ at _________________________.

(City and State)

I declare under penalty of perjury under California law that the foregoing is true and correct.

________________________________________
(Signature)

________________________________________
(Typed or written name)

END OF SECTION
SECTION 00250

BID BOND

KNOW ALL MEN BY THESE PRESENTS,

That we, ________________________________, as Principal, and ________________________________, as Surety, are held and firmly bound, along with our respective heirs, executors, administrators, successors and assigns, jointly and severally, unto RIO HONDO COMMUNITY COLLEGE DISTRICT, hereinafter “Obligee,” for payment of the penal sum hereof in lawful money of the United States, as more particularly set forth herein.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT:

WHEREAS, the Principal has submitted the accompanying Bid Proposal for the Work commonly described as __________________________________________________________ and the Bid Proposal must be accompanied by Bid Security.

WHEREAS, subject to the terms of this Bond, the Surety is firmly bound unto the Obligee in the penal sum of TEN PERCENT (10%) of the maximum amount of the Bid Proposal submitted by the Principal to the Obligee, as set forth above, inclusive of additive alternate bid items, if any.

NOW THEREFORE, if the Principal shall not withdraw said Bid Proposal within the period specified therein after the opening of the same, or, if no period be specified, for Ninty (90) days after opening of said Bid Proposal; and if the Principal is awarded the Contract, and shall within the period specified therefore, or if no period be specified, within five (5) days after the prescribed forms are presented to him for signature, enter into a written contract with the Obligee, in accordance with the Bid Proposal as accepted, and give such bond(s) with good and sufficient surety or sureties, as may be required, for the faithful performance and proper fulfillment of such Contract and for the payment for labor and materials used for the performance of the Contract, or in the event of the withdrawal of said Bid Proposal within the period specified for the holding open of the Bid Proposal or the failure of the Principal to enter into such Contract and give such bonds within the time specified, if the Principal shall pay the Obligee the difference between the amount specified in said Bid Proposal and the amount for which the Obligee may procure the required Work and/or supplies, if the latter amount be in excess of the former, together with all costs incurred by the Obligee in again calling for Bids or otherwise procuring said Work or supplies, then the above obligation shall be void and of no effect, otherwise to remain in full force and effect.

Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or the Call for Bids, the Work to be performed
thereunder, the Drawings or the Specifications accompanying the same, or any other portion of the Contract Documents shall in any way affect its obligations under this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of said Contract, the Call for Bids, the Work, the Drawings or the Specifications, or any other portion of the Contract Documents.

In the event that suit or other proceeding is brought upon this Bond by the Obligee, the Surety shall pay to the Obligee all costs, expenses and fees incurred by the Obligee in connection therewith, including without limitation, attorneys’ fees.

IN WITNESS WHEREOF, the Principal and Surety have executed this instrument this _______ day of ______________, 20___ by their duly authorized agents or representatives.

Bidder:
(Corporate Seal)

______________________________
(Principal’s Name)

By: ___________________________
(Signature)

______________________________
(Typed or Printed Name & Title)

______________________________
(Address)

Surety
(Corporate Seal)

______________________________
(Surety’s Name)

By: ___________________________
(Signature of Attorney-in-Fact for Surety)

(Attach Attorney-in-Fact Certificate)

______________________________
(Typed or Printed Name)

______________________________
(Address of Surety’s Office where Bond is issued)

______________________________
(Area Code and Telephone Number of Surety)

RIO HONDO COLLEGE
FITNESS CENTER MECHANICAL UPGRADE PROJECT

BID BOND

PAGE 2 OF 2
SECTION 00300

AGREEMENT

THIS AGREEMENT is made this ___ day of ____________, 20___, in the County of Los Angeles, State of California, by and between RIO HONDO COMMUNITY COLLEGE DISTRICT, a California Community College District, hereinafter called the “District” and _____ ________________, hereinafter called the “Contractor”, with a principal place of business located at ______________________________.

WITNESSETH, that the District and the Contractor in consideration of the mutual covenants contained herein agree as follows:

1.01 The Work. Within the Contract Time and for the Contract Price, subject to adjustments thereto pursuant to the Contract Documents, the Contractor shall perform and provide all necessary labor, materials, tools, equipment, utilities, services and transportation to complete in a workmanlike manner all of the Work required in connection with the work of improvement commonly referred to as: BID # 2030 FITNESS CENTER MECHANICAL UPGRADE PROJECT

1.02 Contractor shall complete all Work covered by the Contract Documents, including without limitation, the Drawings and Specifications prepared by the Architect, and other Contract Documents enumerated in Article 5 below, along with all modifications and addenda thereto issued in accordance with the Contract Documents.

1.02 Contract Time. The Work shall be commenced on the date stated in the District’s Notice to Proceed. The Contractor shall achieve Substantial Completion of the Work within __________ (____) calendar days after the date stated in the District’s Notice to Proceed (see Section 1.01 of the Contract Special Conditions and as otherwise provided in the Contract Documents).

1.03 Contract Price. The District shall pay the Contractor as full consideration for the Contractor’s full, complete and faithful performance of the Contractor’s obligations under the Contract Documents, subject to any additions or deduction as provided for in the Contract Documents, the Contract Price of ________________ Dollars ($________________). The Contract Price is based upon the Contractor’s Base Bid Proposal and the following Alternate Bid Items, if any:

The District’s payment of the Contract Price shall be in accordance with the Contract Documents.
1.04 **Liquidated Damages.** In the event of the failure or refusal of the Contractor to achieve Completion of the Work of the Contract Documents within the Contract Time, as adjusted, the Contractor shall be subject to assessment of Liquidated Damages in accordance with the Contract Documents.

1.05 **The Contract Documents.** The Contract Documents consist of the following:

<table>
<thead>
<tr>
<th>Notice to Contractors Calling for Bids</th>
<th>Labor and Material Payment Bond</th>
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</thead>
<tbody>
<tr>
<td>Instructions for Bidders</td>
<td>Performance Bond</td>
</tr>
<tr>
<td>Bid Proposal</td>
<td>Certificate of Workers Compensation</td>
</tr>
<tr>
<td>Subcontractors List</td>
<td>Drug Free Workplace Certification</td>
</tr>
<tr>
<td>Non-Collusion Affidavit</td>
<td>General Conditions</td>
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<tr>
<td>Bid Bond</td>
<td>Special Conditions</td>
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<td>Agreement</td>
<td>Guarantee</td>
</tr>
<tr>
<td>Construction Forms</td>
<td>Specifications</td>
</tr>
<tr>
<td>DVBE Participation Goal</td>
<td>Drawings</td>
</tr>
</tbody>
</table>

1.06 **Authority to Execute.** The individual(s) executing this Agreement on behalf of the Contractor is/are duly and fully authorized to execute this Agreement on behalf of Contractor and to bind the Contractor to each and every term, condition and covenant of the Contract Documents.

IN WITNESS WHEREOF, this Agreement has been duly executed by the District and the Contractor as of the date set forth above.

**DISTRICT**

RIO HONDO COMMUNITY COLLEGE DISTRICT,
a California Community College District

____________________________

**CONTRACTOR**

____________________________

(Contractor’s License Number)

By: __________________________

Vice President, Business

By: __________________________

Name: ________________________

Title: _________________________

(Corporate Seal)

END OF SECTION
SECTION 00400

LABOR AND MATERIAL PAYMENT BOND

(CIVIL CODE §3247)

KNOW ALL MEN BY THESE PRESENTS,

That we, ____________________________, as Principal, and ____________________________, as Surety, are held and firmly bound, along with our respective heirs, executors, administrators, successors and assigns, jointly and severally, unto RIO HONDO COMMUNITY COLLEGE DISTRICT, hereinafter "Obligee", for payment of the penal sum of ____________________________ Dollars ($______) in lawful money of the United States, as more particularly set forth herein.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT:

WHEREAS, the Obligee, by resolution of its Board of Trustees, has awarded to the Principal a Contract for the work commonly described as: “Bid #2030 FITNESS CENTER MECHANICAL UPGRADE PROJECT”

WHEREAS, the Principal, on or about _____________ , 20___, entered into a Contract with the Obligee for performance of the Work; the Agreement and all other Contract Documents set forth therein are incorporated herein and made a part hereof by this reference.

WHEREAS, by the terms of the Contract Documents, the Principal is required to furnish a bond for the prompt, full and faithful payment to any Claimant, as hereinafter defined, for all labor, materials or services used, or reasonably required for use, in the performance of the Work.

NOW THEREFORE, if the Principal shall promptly, fully and faithfully make payment to any Claimant for all labor, materials or services used or reasonably required for use in the performance of the Work, then this obligation shall be void; otherwise, it shall be, and remain, in full force and effect.

The term "Claimant" shall refer to any person, corporation, partnership, proprietorship or other entity including without limitation, all persons and entities described in California Civil Code §3181, providing or furnishing labor, materials or services used or reasonably required for use in the performance of the Work under the Contract Documents, without regard for whether such labor, materials or services were sold, leased or rented. This Bond shall inure to the benefit of all Claimants so as to give them, or their assigns and successors, a right of action upon this Bond.

RIO HONDO COLLEGE FITNESS CENTER MECHANICAL UPGRADE PROJECT

LABOR AND MATERIAL PAYMENT BOND

PAGE 1 OF 2
In the event that suit is brought on this Bond by any Claimant for amounts due such Claimant for labor, materials or services provided or furnished by such Claimant, the Surety shall pay for the same and reasonable attorneys’ fees pursuant to California Civil Code §3250.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, deletion, addition, or any other modification to the terms of the Contract Documents, the Work to be performed thereunder, the Specifications or the Drawings, or any other portion of the Contract Documents, shall in any way limit, restrict or otherwise affect its obligations under this Bond; the Surety hereby waives notice from the Obligee of any such change, extension of time, alteration, deletion, addition or other modification to the Contract Documents, the Work to be performed under the Contract Documents, the Drawings or the Specifications of any other portion of the Contract Documents.

IN WITNESS WHEREOF, the Principal and Surety have executed this instrument this _______ day of _____________, 20___ by their duly authorized agents or representatives.

(Corporate Seal) (Principal Name)
By: ____________________________
   (Signature)
   (Typed or Printed Name)
   Title: __________________________

(Corporate Seal) (Surety Name)
By: ____________________________
   (Signature of Attorney-in-Fact for Surety)
   (Typed or Printed Name of Attorney-in-Fact)
   (Address)
   (Area Code and Telephone Number of Surety)
SECTION 00410

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS,

That we______________________________, as Principal, and ________________________________, as Surety, are held and firmly bound, along with our respective heirs, executors, administrators, successors and assigns, jointly and severally, unto RIO HONDO COMMUNITY COLLEGE DISTRICT, hereinafter “Obligee”, for payment of the penal sum of______________________________ Dollars ($____________) in lawful money of the United States, as more particularly set forth herein.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT:

WHEREAS, the Obligee, by action of its Board of Trustees, has awarded to the Principal a Contract for the Work commonly described as: “Bid #2030 FITNESS CENTER MECHANICAL UPGRADE PROJECT”

WHEREAS, the Principal, on or about__________20____________, entered into a contract with the Obligee for performance of the Work; the Agreement and all other Contract Documents set forth therein are incorporated herein and made a part hereof by this reference.

WHEREAS, by the terms of the Contract Documents (“Contract”), the Principal is required to furnish a bond ensuring the Principal’s prompt, full and faithful performance of the Work of the Contract.

WHEREAS, the Principal and the Surety, jointly and severally, bind themselves, their heirs, executors, administrative, successors and assigns, to the Obligee for the prompt, full and faithful performance of the Contract, which is incorporated herein by this reference.

NOW, THEREFORE, if the Principal shall promptly, fully and faithfully perform each and all of the obligations and things to be done and performed by the Principal in strict accordance with the terms of the Contract as said Contract may be modified or amended from time to time; and if the Principal shall indemnify and save harmless the Obligee and all of its officers, agents and employees from any and all losses, liability and damages, claims, judgments, stop notices, costs, and fees of every description, whether imposed by law or equity, which may be incurred by the Obligee by reason of the failure or default on the part of the Principal in the performance of any or all of the terms or the obligations of the Contract, including all modifications and amendments thereto, and any warranties or guarantees required thereunder; then this obligation shall be void; otherwise, it shall be, and remain, in full force and effect.
In the event the Principal is declared by the Obligee to be in breach or default in the performance of the Contract, then, after written notice from the Obligee to the Surety, as provided for herein, the Surety shall either remedy the default or breach of the Principal or shall take charge of the Work of the Contract and complete the Contract with a Contractor other than the Principal at its own expense; provided, however, that the procedure by which the Surety undertakes to discharge its obligations under this Bond shall be subject to the advance written approval of the Obligee.

If the Surety does not proceed to cure or remedy the Principal's default(s) of its performance of the Contract with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen (15) calendar days after receipt of a written notice from Obligee to the Surety demanding that the Surety perform its obligations under this Bond, and the Obligee shall be entitled to enforce any remedy available to Obligee.

Within fifteen (15) calendar days of Obligee's written notice to the Surety of the failure of performance of the Contract by the Principal, it shall be the duty of the Surety to give to the Obligee an unequivocal notice in writing of the Surety's election to remedy the default(s) of the Principal promptly, or to arrange for performance of the Contract promptly by a Contractor other than the Principal, time being of essence to this Bond. In said Notice of Election, the Surety shall state the date of commencement of its cure or remedy of the Principal's default(s) or its performance of the Contract. The Surety's obligations for cure or remedy, include but are not limited to: correction of defective or incomplete work and completion of the Contract, additional legal, design professional and delay costs arising from Surety's actions or failure to act; and liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance by the Principal. The Surety shall give prompt written notice to the Obligee upon completion of the cure or remedy of the Principal's default(s) of its performance of the Contract.

In the event the Surety shall fail to issue its Notice of Election to Obligee within the time provided for herein above, the Obligee may thereafter cause the cure or remedy of the Principal's failure of performance or default or to complete the Work. The Principal and the Surety shall be each jointly and severally liable to the Obligee for all damages and costs sustained by the Obligee as a result of the Principal's failure of performance under the Contract Documents or default in its performance of obligations thereunder, including without limitation the costs of cure or completion exceeding the then remaining balance of the Contract Price.

The Surety, for value received, hereby stipulates and agrees that no change or adjustment of the Contract Time or Contract Price, alterations, deletions, additions or any other modifications to the Contract Documents, or the Work to be performed thereunder, shall in any way limit, restrict, or otherwise affect the obligations of the Surety under this Bond. Surety waives notice of any change or adjustment of the Contract Time or Contract Price, alterations, deletions, additions or any other modifications to the Contract Documents, or the Work to be performed thereunder and agrees to automatically adjust the penal sum of this Bond to reflect any adjustments of the Contract Time or Contract Price which increase the Contract Price.
Principal and Surety agree that if Obligee is required to engage the services of an attorney in connection with enforcement of this Bond, each shall pay Obligee's costs and reasonable attorney's fees incurred, with or without suit, in addition to the above penal sum.

The guarantees contained in this Bond survive Final Completion of the Work called for in the Contract Documents with respect to the obligations and liabilities of the Principal, which survive Final Completion of the Work.

IN WITNESS WHEREOF, the Principal and Surety have executed this instrument this _______day of ____________, 20__ by their duly authorized agents or representatives.

(Corporate Seal)  
(Principal Name)  
By:  
(Signature)  
(Typed or Printed Name)  
Title:

(Corporate Seal)  
(Surety Name)  
By:  
(Signature of Attorney-in-Fact for Surety)  
(Typed or Printed Name of Attorney-in-Fact)  
(Address)  
(Area Code and Telephone Number of Surety)
SECTION 00415

CERTIFICATE OF WORKERS' COMPENSATION INSURANCE

I, _______________________________ the ________________________________,
of _________________________________________________, declare, state and certify that:

1.01 I am aware that California Labor Code §3700(a) and (b) provides:

"Every employer except the state shall secure the payment of compensation in one or more of the following ways:

A. By being insured against liability to pay compensation in one or more insurers duly authorized to write compensation insurance in this state.

B. By securing from the Director of Industrial Relations a certificate of consent to self-insure either as an individual employer, or one employer in a group of employers, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his or her employees."

1.02 I am aware that the provisions of California Labor Code §3700 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 I will comply with such provisions before commencing the performance of this Contract.

By: ________________________________  
(Signature)  
__________________________________  
(Date)
SECTION 00417

DRUG-FREE WORKPLACE CERTIFICATION

I, ______________________ (Name) ______________________ (Title),
of ______________________, declare, state and certify that:

1.01 I am aware of the provisions and requirements of California Government Code §§8350 et seq., the Drug Free Workplace Act of 1990.

1.02 I am authorized to certify, and do certify, on behalf of Contractor that a drug free workplace will be provided by Contractor by doing all of the following:

A. Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensation, possession or use of a controlled substance is prohibited in Contractor's workplace and specifying actions which will be taken against employees for violation of the prohibition;

B. Establishing a drug-free awareness program to inform employees about all of the following:
   1. The dangers of drug abuse in the workplace;
   2. Contractor's policy of maintaining a drug-free workplace;
   3. The availability of drug counseling, rehabilitation and employee-assistance programs; and
   4. The penalties that may be imposed upon employees for drug abuse violations;

C. Requiring that each employee engaged in the performance of the Contract be given a copy of the statement required by subdivision (A), above, and that as a condition of employment by Contractor in connection with the Work of the Contract, the employee agrees to abide by the terms of the statement.

1.03 Contractor agrees to fulfill and discharge all of Contractor's obligations under the terms and requirements of California Government Code §8355 by, inter alia, publishing a statement notifying employees concerning: (a) the prohibition of any controlled substance in the workplace, (b) establishing a drug-free awareness program, and (c) requiring that each employee engaged in the performance of the Work of the Contract be given a copy of the statement required by California Government Code §8355(a) and requiring that the employee agree to abide by the terms of that statement.
1.04 Contractor and I understand that if the District determines that Contractor has either: (a) made a false certification herein, or (b) violated this certification by failing to carry out and to implement the requirements of California Government Code §8355, the Contract awarded herein is subject to termination, suspension of payments, or both. Contractor and I further understand that, should Contractor violate the terms of the Drug-Free Workplace Act of 1990, Contractor may be subject to debarment in accordance with the provisions of California Government Code §§8350, et seq.

1.05 Contractor and I acknowledge that Contractor and I are aware of the provisions of California Government Code §§8350, et seq. and hereby certify that Contractor and I will adhere to, fulfill, satisfy and discharge all provisions of and obligations under the Drug-Free Workplace Act of 1990.

I declare under penalty of perjury under the laws of the State of California that all of the foregoing is true and correct.

Executed at ______________________ this _________ day of _________, 20____

(City and State)

________________________________________

(Signature)

________________________________________

(Typed or Printed Name)
SECTION 00520

DISABLED VETERAN BUSINESS ENTERPRISE (“DVBE”) PARTICIPATION GOAL

1. **DVBE Participation Policy.** The District is committed to achieving a Participation Goal for Disabled Veteran Business Enterprises (“DVBEs”). Through the DVBE participation program, the District encourages contractors to ensure maximum opportunities for the participation of DVBEs in the Work of the Contract.

2. **Definitions.**

2.1 **Disabled Veteran.** A "Disabled Veteran" means a veteran of the military, naval, or air service of the United States with at least ten percent (10%) service-connected disability who is domiciled in the State of California.

2.2 **Disabled Veteran Business Enterprise.** A "Disabled Veteran Business Enterprise" ("DVBE") means a business enterprise certified by the Office of Small and Minority Business, State of California, Department of General Services, pursuant to Military and Veterans Code §999, or an enterprise certifying that it is a DVBE by meeting all of the following requirements: (a) it is a sole proprietorship at least fifty-one percent (51%) owned by one or more Disabled Veterans, or in the case of a publicly owned business, at least fifty-one percent (51%) of its stock is owned by one or more Disabled Veterans; or a subsidiary wholly owned by a parent corporation, but only if at least fifty-one percent (51%) of the voting stock of the parent corporation is owned by one or more Disabled Veterans; or a joint venture in which at least fifty-one percent (51%) of the joint venture's management and control and earnings are held by one or more Disabled Veterans; (b) the management and control of the daily business operations are by one or more Disabled Veterans; provided that the Disabled Veteran(s) exercising management and control of the business enterprise are not required to be the same Disabled Veteran(s) who is/are the equity Owner(s) of the business enterprise; and (c) it is a sole proprietorship, corporation, or partnership with its home office located in the United States and which is not a branch or subsidiary of a foreign corporation, foreign firm, or other foreign-based business. The terms "foreign corporation" "foreign firm" and "foreign-based business" shall be deemed to mean a business entity that is incorporated or which has its principal headquarters located outside the United States of America.

3. **DVBE Participation Goal.** The term "Participation Goal" is a numerically expressed objective for DVBE participation in performing the Work of the Contract. The Participation Goal is not a quota, set-aside or rigid proportion. Through action of the District’s Board of Trustees, the District has established a DVBE Participation Goal of **Three Percent (3%)** of the total Contract Amount.
4. **Monitoring of DVBE Participation and Submission of Report.**

4.1 **Certification of Participation.** At the time of execution of the contract, the Contractor will provide a statement to the District of anticipated participation of Disabled Veteran Business Enterprises in the contract.

4.2 **Submission of Report.** During performance of the Contract, Contractor shall monitor the Work of the Contract, award of subcontracts and contracts for materials, equipment and supplies for the purpose of determining DVBE participation in the Work of the Contract. Contractor shall report on a monthly basis all DVBE’s utilized in the performance of the Work, the type or classification of the Work performed by each such DVBE and the dollar value of the Work performed by each such DVBE. In addition, upon completion of the Work of the Contract, Contractor shall submit a report to the District in the form attached hereto identifying all DVBEs utilized in the performance of the Work, the type or classification of the Work performed by each such DVBE and the dollar value of the Work performed by each such DVBE. The submission to the District of such report shall be deemed a condition precedent to the District's obligation to make payment of the Final Payment under the Contract Documents. The submission of such report shall be in addition to, and not in lieu of, any other conditions precedent set forth in the Contract Documents for the District's obligation to make payment of the Final Payment. The District reserves the right to request additional information or documentation from the Contractor evidencing efforts to comply with the DVBE Participation Goal.

4.3 **Contract Audit.** Contractor agrees that the District, or its designee, shall have the right to review, obtain and/or copy any and all writings, materials, documents and other records pertaining to the performance of the Contract. Contractor agrees that the District, or its designee, shall have access to any of Contractor’s premises upon reasonable notice, during usual business hours for the purpose of interviewing employees and inspecting and/or copying such writings, materials, documents and other documents which may be relevant to a matter under investigation for the purpose of determining compliance with the DVBE Participation Goal.
CERTIFICATION – PARTICIPATION OF
DISABLED VETERAN BUSINESS ENTERPRISES

I certify that I have read the foregoing SECTION 00520 DISABLED VETERAN BUSINESS ENTERPRISE (“DVBE”) PARTICIPATION GOAL and will comply with the requirements as set forth in this contract.

Signature

Typed or Printed Name

Title

Company

Street Address

City, State, Zip

Telephone

Fax

E-mail
DVBE PARTICIPATION REPORT

Contractor Name: ______________________________________

Project Name: _________________________________________

Date: _________________________________________________

<table>
<thead>
<tr>
<th>Firm Name of DVBE</th>
<th>Trade/Portion of Work</th>
<th>Value of Work</th>
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<tbody>
<tr>
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Does the cumulative dollar value of the foregoing DVBE participation meet or exceed three percent (3%) of the final Contract Amount, as adjusted by all change orders?

YES ___________ NO ___________

If your response is "NO", please attach to this Report a detailed description of the reasons for your failure to achieve the District's DVBE Participation Goal.
SECTION 00530

GUARANTEE

RIO HONDO COMMUNITY COLLEGE DISTRICT

__________________________ (Contractor's Name) hereby unconditionally guarantees that the work performed under and pursuant to District’s Contract No. ________ for the Project known as ______________________________ (“Project”) has been done in strict accordance with the requirements of the Contract and therefore further guarantees the work of the contract to be and remain free of defects in workmanship and materials for a period of one (1) year from the date of completion of the contract, unless a longer guarantee period is called for by the Contract Documents, in which case the terms of the longer guarantee shall govern. The Contractor hereby agrees to repair or replace any and all work, together with any other work which may have been damaged or displaced in so doing, that may prove to be not in accordance with the requirements of the Contract or that may be defective in its workmanship or materials within the guarantee period specified, without any expense whatsoever to the District, ordinary wear and tear and unusual abuse and neglect only excepted. The Contractor has provided contract bonds which will remain in full force and effect during the guarantee period.

The Contractor further agrees that within ten (10) calendar days after being notified in writing by the District of any work not in accordance with the requirements of the contract or any defects in the work, he will commence and prosecute with due diligence all work necessary to fulfill the terms of this guarantee, and to complete the work within a reasonable period of time. In the event he fails to so comply, he does hereby authorize the District to proceed to have such work done at the Contractor’s expense and he will pay the cost thereof upon demand. The District shall be entitled to all costs, including reasonable attorneys’ fees, necessarily incurred upon the Contractor’s refusal to pay the above costs.

Notwithstanding the foregoing paragraph, in the event of an emergency constituting an immediate hazard to the health or safety of the employees of the District, or its property or licensees, the District may undertake at the Contractor’s expense without prior notice, all work necessary to correct such hazardous condition when it was caused by the work of the Contractor not being in accordance with the requirements of this contract, or being defective, and to charge the same to the Contractor as specified in the preceding paragraph.

The guarantee set forth herein is not intended by the parties, nor shall it be construed, as in any way limiting or reducing the District’s rights to enforce all terms of the contract referenced hereinabove or the time for enforcement thereof. This guarantee is provided in addition to, and not in lieu of, the District’s rights on such contract.
CONTRACTOR’S SIGNATURE

SUBCONTRACTOR’S SIGNATURE

Representative to be contacted for services:

Name: ____________________________

Address: ____________________________

Phone No.: ____________________________

Fax No.: ____________________________
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ARTICLE 1: DEFINITIONS; GENERAL

1.1 Architect. The Architect is the person or entity identified as such in the Agreement; references to the "Architect" includes the Architect's authorized representative and his, her or its successor(s).

1.2 Construction Equipment. "Construction Equipment" is equipment utilized for the performance of any portion of the Work, but which is not incorporated into the Work.

1.3 Contract Documents. The Contract Documents consist of the Agreement between the District and the Contractor, Conditions of the Contract (whether General, Special or otherwise), Drawings, Specifications, including addenda thereto issued prior to execution of the Agreement and any other documents listed in the Agreement. The Contract Documents shall include modifications issued after execution of the Agreement. The Contract Documents form the Contract for Construction.

1.4 Contract Document Terms. The term "provide" means "provide complete in place" or to "furnish and install" such item. Unless otherwise provided in the Contract Documents, the terms "approved;" "directed;" "satisfactory;" "accepted;" "acceptable;" "proper;" "required;" "necessary" and "equal" shall mean as approved, directed, satisfactory, accepted, acceptable, proper, required, necessary and equal, in the opinion of the District, its agents or representatives. The term "typical" as used in the Drawings shall require the installation or furnishing of such item(s) of the Work designated as "typical" in all other similar areas; Work in such other areas shall conform to that shown as "typical" or as reasonably inferable therefrom.

1.5 Contractor. The Contractor is the person or entity identified as such in the Agreement; references to "Contractor" include the Contractor's authorized representative.

1.6 Contractor's Superintendent. The Contractor's Superintendent is the individual employed by the Contractor whose principal responsibility shall be the supervision and coordination of the Work; the Contractor's Superintendent shall not perform routine construction labor.

1.7 Days. Unless otherwise expressly stated, references to "days" in the Contract Documents shall be deemed to be calendar days.

1.8 Deferred Approval Items. Deferred approval items are those items that shall not be started until detailed plans, specifications, and engineering calculations have been accepted and signed by the Architect/Engineer and the Division of the State Architect.

1.9 District. The "District" refers to Rio Hondo Community College District and its authorized representatives, including the Construction Manager, the Program Manager, the District's Board of Trustees and the District’s officers, employees, agents and representatives.

1.10 District's Inspector. The District's Inspector is the individual designated and employed by the District in accordance with the requirements of Title 24 of the California Code of Regulations. The District's Inspector shall be authorized to act on behalf of the District as provided for in the
Contract Documents and in Title 24 of the California Code of Regulations, as the same may be amended from time to time.

1.11 Division of State Architect ("DSA"). The DSA is the California Division of the State Architect including without limitation the DSA's Office of Construction Services, Office of Design Services and the Office of Regulation Services; references to the DSA in the Contract Documents shall mean the DSA, its offices and its authorized employees and agents. The authority of the DSA over the Work and the performance thereof shall be as set forth in the Contract Documents and Title 24 of the California Code of Regulations.

1.12 Drawings and Specifications. The Drawings are the graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing generally, the design, location and dimensions of the Work and may include without limitation, plans, elevations, sections, details, schedules, notes or diagrams. The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, construction systems, standards, criteria and workmanship for the Work and related services. The Drawings and Specifications are intended to delineate and describe the Work and its component parts so as to permit skilled and competent contractors to bid upon the Work and prosecute the same to completion.

1.13 Intent and Correlation of Contract Documents.

1.13.1 Work of the Contract Documents. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary and what is required by one shall be as binding as if required by all. Performance by the Contractor shall be required to the extent consistent with the Contract Documents and reasonably inferable therefrom as being necessary to produce the intended results. Organization of the Specifications into divisions, sections or articles, and the arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade. Where any portion of the Contract Documents is silent and information appears elsewhere in the Contract Documents, such other portions of the Contract Documents shall control. Work not particularly detailed, marked or specified shall be the same as similar parts that are detailed, marked or specified.

1.13.2 Technical Terms. Unless otherwise stated in the Contract Documents, words or terms, which have, well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

1.13.3 Conflict in Contract Documents. The Contract Documents are intended to be fully cooperative and to agree. If Contractor observes any conflict, inconsistency or ambiguity, Contractor shall promptly notify the District and the Architect in writing of such conflict, inconsistency or ambiguity prior to commencement of affected Work. If a conflict, inconsistency or ambiguity arises, the following order or precedence shall generally apply, provided, however, that the order of precedence shall not be so rigidly interpreted as to create an absurd or costly result: Special Conditions shall take precedence over General Conditions, Specifications shall take precedence over Drawings and shall govern as to materials, workmanship and installation procedures. Plans identify the scope and location of the Work. With regard to Drawings, figures govern over scaled dimensions, larger details
govern over general drawings, addenda and change order drawings govern over contract drawings, contract drawings govern over standard drawings.

1.14 Material Supplier. A Material Supplier is any person or entity who only furnishes materials, equipment or supplies for the Work without fabricating, installing or consuming them in the Work.

1.15 Project. The Project is the total construction of which the Work performed by the Contractor under the Contract Documents may be the whole or a part of the Project and which may include construction by the District or by separate contractors.

1.16 Construction Manager. The Construction Manager, if any, is the individual or entity designated as such in the Special Conditions. The Construction Manager is an independent contractor retained by the District and shall be authorized and empowered to act on behalf of the District. The removal or replacement of the designated Construction Manager shall not result in adjustment of the Contract Price or the Contract Time or otherwise affect, limit or restrict Contractor's obligations hereunder.

1.17 Record Documents. The Record Documents are a set of the Drawings and Specifications marked by the Contractor during the performance of the Work to indicate completely and accurately the actual as-built condition of the Work. The Record Documents shall be sufficient for a capable and qualified draftsman to modify the Drawings to reflect and indicate the Work actually in place at Final Completion of the Work.

1.18 Shop Drawings; Samples; Product Data (“Submittals”). Shop Drawings are diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor of any tier, manufacturer, Material Supplier, or distributor to illustrate some portion of the Work. Samples are physical examples of materials, equipment or workmanship forming a part of, or to be incorporated into the Work. Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work. Shop Drawings, Samples and Product Data prepared or furnished by the Contractor or any of its Subcontractors or Material Suppliers are collectively referred to as “Submittals”.

1.19 Site. The Site is the physical area designated in the Contract Documents for Contractor’s performance, construction and installation of the Work.

1.20 Subcontractors; Sub-Subcontractors. A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work. "Subcontractor" does not include a separate contractor to the District or subcontractors of any separate contractor. A Sub-Subcontractor is a person or entity of any tier, who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site.

1.21 Special Conditions. If made a part of the Contract Documents, Special Conditions are special or supplemental provisions, not otherwise provided for in the Agreement or the General Conditions.

1.22 Surety. The Surety is the person or entity that executes, as surety, the Contractor's Labor and Material Payment Bond and/or Performance Bond or other bonds provided by the Contractor.
1.23 Work. The "Work" is the construction and services required by theContract Documents, whether completed or partially completed, and includes all other labor, materials, equipment or services provided or to be provided by the Contractor to fulfill the Contractor's obligations under the Contract Documents. The Work may constitute the whole or a part of the Project.

ARTICLE 2: DISTRICT

2.1 Information Required of District.

2.1.1 Surveys; Site Information. District may provide information concerning physical characteristics of the Site. Information not provided by the District concerning physical characteristics of the Site, which is required, shall be obtained by Contractor without adjustment to the Contract Price or the Contract Time.

2.1.2 Drawings and Specifications. All of the Drawings and the Specifications shall remain the property of the District; the Contractor shall not use the Drawings or the Specifications in connection with any other work of improvement other than the Work of the Project.

2.1.3 Furnishing of Information. Information or services to be provided by the District under the Contract Documents shall be furnished by the District with reasonable promptness to avoid delay in the orderly progress of the Work. Information about existing conditions furnished by the District under the Contract Documents is obtained from sources believed to be reliable, but the District neither guarantees nor warrants that such information is complete and accurate. The Contractor shall verify all information provided by the District. To the extent that the Contract Documents depict existing conditions on or about the Site, or the Work involves the renovation, removal or remodeling of existing improvements, or the Work involves any tie-in or other connection with any existing improvements, the conditions and/or existing improvements depicted in the Contract Documents are as they are believed to exist.

2.2 District's Right to Stop the Work. In addition to the District's right to suspend the Work or terminate the Contract pursuant to the Contract Documents, the District may, by written order, direct the Contractor to stop the Work, or any portion thereof, until the cause for such stop work order has been eliminated, if the Contractor: (i) fails to correct Work which is not in conformity and in accordance with the requirements of the Contract Documents, or (ii) otherwise fails to carry out the Work in conformity and accordance with the Contract Documents. The right of the District to stop the Work hereunder shall not be deemed a duty on the part of the District to exercise such right for the benefit of the Contractor or any other person or entity, nor shall the District's exercise of such right waive or limit the exercise of any other right or remedy of the District under the Contract Documents or at law.

2.3 Partial Occupancy or Use.

2.3.1 District's Right to Partial Occupancy. The District may occupy or use any completed or partially completed portion of the Work, provided that the District and the Contractor have accepted, in writing, the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, utilities, damage to the Work, insurance
and the period for correction of the Work and commencement of warranties required by the Contract Documents for such portion of the Work partially used or occupied by the District. If the Contractor and the District are unable to agree upon the matters set forth above, the District may nevertheless use or occupy any portion of the Work, with the responsibility for such matters subject to resolution in accordance with the Contract Documents. Immediately prior to such partial occupancy or use of the Work, or portions thereof, the District, the District's Inspector, the Contractor and the Architect shall jointly inspect the portions of the Work to be occupied or to be used to determine and record the condition of the Work. The District’s use or occupancy of the Work or portions thereof pursuant to the preceding shall not be deemed “completion” of the Work as that term is used in Public Contract Code §7107.

2.3.2 No Acceptance of Defective or Nonconforming Work. Unless otherwise expressly agreed upon by the District and the Contractor, the District's partial occupancy or use of the Work or any portion thereof, shall not constitute the District's acceptance of the Work not complying with the requirements of the Contract Documents or which is otherwise defective.

2.4 The District's Inspector. In addition to the authority and rights of the District's Inspector as provided for elsewhere in the Contract Documents, all of the Work shall be performed under the observation of the District's Inspector in accordance with the provisions of Title 24 of the California Code of Regulations. The District's Inspector shall have access to all parts of the Work at any time, wherever located, including shop inspections, and whether partially or completely fabricated, manufactured, furnished or installed. The performance of the duties of the District's Inspector under the Contract Documents shall not relieve or limit the Contractor's performance of its obligations under the Contract Documents.

ARTICLE 3: ARCHITECT

3.1 Architect's Administration of the Contract.

3.1.1 Administration of Contract. The Architect will provide administration of the Contract as described in the Contract Documents, and will be one of the District's representatives during construction until the time that Final Payment is due the Contractor. The Architect will advise and consult with the District, the Construction Manager and the District's Inspector with respect to the administration of the Contract and the Work. The Architect shall have the responsibilities and powers established by law, including Title 24 of the California Code of Regulations.

3.1.2 Periodic Site Inspections. The Architect will visit the Site at intervals appropriate to the stage of construction to become generally familiar with the progress and quality of the completed Work and to determine, in general, if the Work is being performed in a manner indicating that the Work, when completed, will be in accordance with the Contract Documents. The Architect will not be required to make exhaustive or continuous Site inspections to check quality or quantity of the Work. On the basis of Site observations as an architect, the Architect will keep the District informed of the progress of the Work, and will endeavor to guard the District against defects and deficiencies in the Work.

3.1.3 Contractor Responsibility for Construction Means, Methods and Sequences. The Architect will not have control over or charge of and will not be responsible for
construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, these being solely the Contractor's responsibility. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or of any other persons performing portions of the Work.

3.1.4 Verification of Applications for Payment. In accordance with Article 8 hereof, the Architect, in conjunction with the Construction Manager, will review the Contractor's Applications for Progress Payments and for Final Payment, verify the extent of Work performed and the amount properly due the Contractor on such Application for Payment.

3.1.5 Rejection of Work. The Architect is authorized to reject Work which is defective or does not conform to the requirements of the Contract Documents. Whenever the Architect considers it necessary or advisable, additional inspections or testing of the Work may be conducted, whether or not such Work is fabricated, installed or completed. Neither this authority of the Architect nor a decision made in good faith by the Architect to exercise or not to exercise such authority shall give rise to a duty or responsibility to the Contractor, Subcontractors, Material Suppliers, their agents or employees, or other persons performing portions of the Work.

3.1.6 Architect's Review of Submittals. The Architect will review and approve or take other appropriate action upon the Contractor's Submittals, but only for the limited purpose of checking for conformance with the design concept expressed in the Contract Documents. Review of Submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's Submittals shall not relieve the Contractor of its obligations under the Contract Documents. The Architect's review of Submittals shall not constitute approval of safety measures, programs or precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item in a Submittal shall not indicate approval of an assembly of which the item is a component. The Architect's review of Submittals will be conducted promptly so as not to delay or hinder the progress of the Work or the activities of the Contractor, the District or the District's separate contractors while allowing sufficient time, in the Architect's reasonable professional judgment, to permit adequate review of Submittals. The foregoing notwithstanding, the Architect's review and return of Submittals will conform with the time limits and other conditions, if any, set forth in the Specifications or the Submittal Schedule if the Submittal Schedule is required by other provisions of the Contract Documents. The Architect’s review and return of Submittals will require a minimum of fourteen (14) days from date of receipt of complete submittal. Deferred approval submittals indicated in the Contract Documents require additional time for processing and review of all submittals.

3.1.7 Changes to the Work; Change Orders. The Architect in conjunction with the Construction Manager will prepare Change Orders and may authorize minor changes in the Work in accordance with Article 9.9 hereof.
3.1.8 Completion. The Architect will conduct observations to determine the date(s) of interim milestones, if any, and the dates of Substantial and Final Completion. The Architect will verify that the Contractor has complied with all requirements of the Contract Documents and is entitled to receipt of Final Payment.

3.1.9 Interpretation of Contract Documents. The Architect will interpret and decide matters concerning the requirements of the Contract Documents on written request of either the District or the Contractor, or as deemed necessary. The Architect's response to such requests will be made in writing with reasonable promptness and within the time limits specified in the Contract Documents. Interpretations and decisions of the Architect will be consistent with the intent of and reasonably inferable from the Contract Documents and will be in writing or in the form of drawings with transmittal letter. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both the District and the Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions so rendered in good faith. The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

ARTICLE 4: THE CONTRACTOR

4.1 Communications. All communications regarding the Work, the performance thereof or the Contract Documents shall be in writing; oral communications, unless reduced to writing, are not binding on the parties. Communications between the Contractor and the District shall be through the District’s Construction Manager. Communications between separate contractors, if any, shall be through the District’s Construction Manager. All written communications between the Contractor and any Subcontractor, Material Supplier or others directly or indirectly engaged by the Contractor to perform or provide any portion of the Work shall be available to the District, the Construction Manager and the Architect for review, inspection and reproduction as may be requested from time to time. Failure or refusal of the Contractor to permit the District, the Construction Manager or Architect to review, inspect or reproduce such written communications may be deemed a default of Contractor hereunder.

4.2 Contractor Review of Contract Documents.

4.2.1 Examination of Contract Documents. The Contractor shall carefully study and compare the Contract Documents with each other and with information furnished by the District pursuant to the Contract Documents and shall at once report to the District any errors, inconsistencies or omissions discovered. If the Contractor performs any Work knowing, or with reasonable diligence should have known that, it involves an error, inconsistency or omission in the Contract Documents without prior written notice to the District of the same, the Contractor shall assume full responsibility for such performance and shall bear all attributable costs for correction of the same.

4.2.2 Field Measurements. Prior to commencement of the Work, or portions thereof, the Contractor shall take field measurements and verify field conditions at the Site and shall carefully compare such field measurements and conditions and other information known to
the Contractor with information provided in the Contract Documents. Errors, inconsistencies or omissions discovered shall be reported to the District at once.

4.2.3 Dimensions; Layouts and Field Engineering. Dimensions indicated in the Drawings are intended for reference only. The Contractor shall be solely responsible for dimensioning and coordinating the Work of the Contract Documents. All field engineering required for laying out the Work and/or establishing grades for earthwork operations shall be by the Contractor at its expense. Any field engineering or other engineering to be provided or performed by the Contractor under the Contract Documents and required or necessary for the proper execution or installation of the Work shall be provided and performed by an engineer duly registered under the laws of the State of California in the engineering discipline for such portion of the Work.

4.2.4 Request for Information. If the Contractor encounters any condition which the Contractor believes, in good faith and with reasonable basis, is the result of an ambiguity, conflict, error or omission in the Contract Documents (collectively “the Conditions”), it shall be the affirmative obligation of the Contractor to timely notify the District, in writing immediately, but no later than three (3) calendar days, of the Conditions encountered and to request information from the District necessary to address and resolve any such Conditions before proceeding with any portion of the Work affected or which may be affected by such Conditions. If the Contractor fails to timely notify the District in writing of any Conditions encountered and the Contractor proceeds to perform any portion of the Work containing or affected by such Conditions, the Contractor shall bear all costs associated with or required to correct, remove, or otherwise remedy any portion of the Work affected thereby without adjustment of the Contract Time or the Contract Price. The Contract Time shall not be subject to adjustment in the event that the Contractor fails to timely request information from the Architect. The foregoing notwithstanding, in the event that the Architect reasonably determines that any of Contractor's request(s) for information: (i) does not reflect adequate or competent supervision or coordination by the Contractor or any Subcontractor; or (ii) does not reflect the Contractor's adequate or competent knowledge of the requirements of the Work or the Contract Documents; or (iii) is not justified for any other reason, Contractor shall be liable to the District for all costs incurred by the District associated with the processing, reviewing, evaluating and responding to any such request for information, including without limitation, fees of the Architect and any other design consultant to the Architect or the District.

4.2.5 Work in Accordance With Contract Documents. The Contractor shall perform all of the Work in strict conformity with the Contract Documents and approved Submittals.

4.3 Site Investigation; Subsurface Conditions.

4.3.1 Contractor Investigation. The Contractor shall be responsible for, and by executing the Agreement acknowledges, that it has carefully examined the Site and has taken all steps it deems reasonably necessary to ascertain all conditions which may affect the Work, or the cost thereof, including, without limitation, conditions bearing upon transportation, disposal, handling or storage of materials; availability of labor or utilities; access to the Site; and the physical conditions and the character of equipment, materials, labor and services necessary
to perform the Work. Any failure of the Contractor to do so will not relieve it from the responsibility for fully and completely performing all Work without adjustment to the Contract Price or the Contract Time. The District assumes no responsibility to the Contractor for any understandings or representations concerning conditions or characteristics of the Site, or the Work, made by any of its officers, employees or agents prior to the execution of the Agreement, unless such understandings or representations are expressly set forth in the Agreement.

4.3.2 Subsurface Data. By executing the Agreement, the Contractor acknowledges that it has examined the subsurface data available and satisfied itself as to the character, quality and quantity of surface and subsurface materials, including without limitation, obstacles which may be encountered in performance of the Work, insofar as this information is reasonably ascertainable from an inspection of the Site, review of available subsurface data and analysis of information furnished by the District under the Contract Documents. Subsurface data or other soils investigation report provided by the District hereunder are not a part of the Contract Documents. Information contained in such data or report regarding subsurface conditions, elevations of existing grades, or below grade elevations are approximate only and is neither guaranteed nor warranted by the District to be complete and accurate. The Contractor shall examine all subsurface data to make its own independent interpretation of the subsurface conditions and acknowledges that its bid is based upon its own opinion of the conditions which may be encountered. The District assumes no responsibility for any conclusions or interpretations made by Contractor on the basis of available subsurface data or other information furnished by District under the Contract Documents.

4.3.3 Subsurface Conditions.

4.3.3.1 Procedures. If the Work under the Contract Documents involves digging trenches or other excavations that extend deeper than four feet below the surface, the Contractor shall promptly and before the following conditions are disturbed, notify the District's Inspector, in writing, of any: (i) material that the Contractor believes may be material that is hazardous waste, as defined in California Health and Safety Code §25117, that is required to be removed to a Class I or Class II or Class III disposal site in accordance with provisions of existing law; (ii) subsurface or latent physical conditions at the site differing from those indicated; or (iii) unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in the Work or the character provided for in the Contract Documents. If upon notice to the District of the conditions described above and upon the District's investigation thereof, the District determines that the conditions so materially differ or involve such hazardous materials which require an adjustment to the Contract Price or the Contract Time, the District shall issue a Change Order in accordance with Article 9 hereof. In accordance with California Public Contract Code §7104, any dispute arising between the Contractor and the District as to any of the conditions listed in (i), (ii) or (iii) above, shall not excuse the Contractor from the completion of the Work within the Contract Time and the Contractor shall proceed with all Work to be performed under the Contract Documents. The District reserves the right to terminate the Contract pursuant to Article 15.2 hereof should the District determine...
not to proceed because of any condition described in (i), (ii) or (iii) above.

4.3.3.2 Trenching. For all excavations in excess of five (5) feet involving an estimated expenditure in excess of $25,000, Contractor shall submit to the District for acceptance a detailed Drawing showing the design of shoring, bracing, sloping or other provisions to be made for the protection of workmen from the hazard of caving ground. If such design varies from the standards established by the Construction Safety Orders of the California Division of Industrial Safety, the Drawing shall be prepared by a registered civil or structural engineer. None of the aforementioned trenching shall be started before Contractor receives notification of acceptance from the District. Contractor shall comply with all other applicable requirements of California Labor Code §6705, and as therein provided, no provisions of that Section or this Section shall be construed to impose tort liability upon the District. In any event, Contractor shall not commence any excavation work until it has secured all necessary permits including the required CAL OSHA excavation/shoring permit. Any permits shall be prominently displayed on the Project premises prior to commencement of any excavation.

4.4 Supervision and Construction Procedures.

4.4.1 Supervision of the Work. The Contractor shall supervise and direct performance of the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract Documents, unless Contract Documents give other specific instructions concerning these matters. The Contractor shall be responsible for inspection of completed or partially completed portions of Work to determine that such portions are in proper condition to receive subsequent Work.

4.4.2 Responsibility for the Work; Coordination of the Work. The Contractor shall be responsible to the District for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and all other persons performing any portion of the Work under a contract with the Contractor. The Contractor shall not be relieved of the obligation to perform the Work in accordance with the Contract Documents either by activities or duties of the Construction Manager, District’s Inspector or the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons other than the Contractor. The Contractor shall be responsible for all necessary or appropriate coordination of the Work and component parts thereof so that Substantial Completion of the Work will be achieved within the Contract Time and the Work will be completed for the Contract Price. The coordination of the Work is a material obligation of the Contractor hereunder and shall include without limitation, conducting regular coordination meetings with its Subcontractors and Material Suppliers, sequencing the operations of Subcontractors and Material Suppliers, and adapting its planned means, methods and sequences of construction operations as necessary to accommodate field or changed conditions at the Site.

4.4.3 Surveys. The Contractor shall prepare or cause to be prepared all detailed surveys necessary for performance of the Work. The Contractor shall be responsible for the establishment, location, maintenance and preservation of benchmarks, reference points and
stakes for the Work, the cost of which shall be included within the Contract Price. The Contractor shall be solely responsible for all loss or costs resulting from the loss, destruction, disturbance or damage of benchmarks, reference points or stakes.

4.4.4 Construction Utilities. The Contractor shall arrange for the furnishing of and shall pay the costs of all utility services, including, without limitation, electricity, water, gas and telephone necessary for performance of the Work and the Contractor's obligations under the Contract Documents. The Contractor shall furnish and install necessary or appropriate temporary distributions of utilities, including meters, to the Site. Any such temporary distributions shall be removed by the Contractor upon completion of the Work. The costs of all such utility services, including the installation and removal of temporary distributions thereof, shall be borne by the Contractor and included in the Contract Price.

4.4.5 Existing Utilities; Removal, Relocation and Protection. In accordance with California Government Code §4215, the District shall assume the responsibility for the timely removal, relocation, or protection of existing main or trunkline utility facilities located on the Site which are not identified in the Drawings, Specifications or other Contract Documents. Contractor shall be compensated for the costs of locating, repairing damage not due to the Contractor's failure to exercise reasonable care, and removing or relocating such utility facilities not indicated in the Drawings, Specifications and other Contract Documents with reasonable accuracy, and for equipment on the Site necessarily idled during such work. Contractor shall not be assessed Liquidated Damages for delay in completion of the Work when such delay is caused by the failure of the District or the utility district to provide for removal or relocation of such utility facilities. Nothing in this Article 4.4.5 shall be deemed to require the District to indicate the presence of existing service laterals or appurtenances whenever the presence of such utilities on the Site can be inferred from the presence of other visible facilities, such as buildings, meters and junction boxes, on or adjacent to the Site. If the Contractor encounters utility facilities not identified by the District in the Drawings, Specifications, or other Contract Documents, the Contractor shall immediately notify, in writing, the District and the utility owner. In the event that such utility facilities are owned by a public utility, the public utility shall have the sole discretion to perform repairs or relocation work or permit the Contractor to do such repairs or relocation work at a price determined in accordance with Article 9 of these General Conditions.

4.4.6 Conferences and Meetings. A material obligation of the Contractor under the Contract Documents is the attendance by the Contractor's supervisory personnel for the Work and the Contractor's management personnel as required by the Contract Documents or as requested by the District. The Contractor's personnel participating in conferences and meetings relating to the Work shall be authorized to act on behalf of the Contractor and to bind the Contractor. The Contractor is solely responsible for arranging for the attendance by Subcontractors, Material Suppliers at meetings and conferences relating to the Work as necessary, appropriate or as requested by the District.

4.4.6.1 Pre-Construction Conference. The Contractor's representatives (and representatives of Subcontractors as requested by the District) shall attend a Pre-Construction Conference at such time and place as designated by the District. The Pre-Construction Conference will address items such as the Contractor's access to the Site,
review of construction procedures and requirements and other matters pertaining
generally to construction of the Work.

4.4.6.2 Progress Meetings. Progress meetings will be conducted on regular intervals
(weekly unless otherwise expressly indicated elsewhere in the Contract Documents. The
Contractor's representatives and representatives of Subcontractors (as requested by the
District) shall attend Progress Meetings. Progress Meetings will be chaired by the
Architect or the Construction Manager and will generally include as agenda items: Site
safety, field issues, coordination of Work, construction progress and impacts to timely
completion, if any. The purposes of the Progress Meetings include: a formal and regular
forum for discussion of the status and progress of the Work by all Project participants, a
review of progress or resolution of previously raised issues and action items assigned to
the Project participants, and reviews of the Progress Schedule and Submittals.

4.4.6.3 Special Meetings. As deemed necessary or appropriate by the District,
Special Meetings will be conducted with the participation of the Contractor,
Subcontractors as requested by the District and other Project participants.

4.4.6.4 Minutes of Meetings. Following conclusion of the Pre-Construction
Conference, Progress Meetings and Special Meetings, the Construction Manager will
prepare and distribute minutes reflecting the items addressed and actions taken at a
meeting or conference. Unless the Contractor notifies the Architect and the Construction
Manager in writing of objections or corrections to minutes prepared hereunder within
five (5) dates of the date of distribution of the minutes, the minutes as distributed shall
constitute the official record of the meeting or conference. If the Contractor timely
interposes objections or notes corrections, the resolution of such matters shall be
addressed at the next scheduled Progress Meeting.

4.5 Labor and Materials.

4.5.1 Payment for Labor, Materials and Services. Unless otherwise provided in the
Contract Documents, the Contractor shall provide and pay for labor, materials, equipment,
tools, applicable taxes, and other facilities and services necessary for proper execution and
completion of the Work, whether temporary or permanent and whether or not incorporated in
the Work.

4.5.2 Employee Discipline and Skills. The Contractor shall enforce strict discipline and
good order among the Contractor's employees, the employees of any Subcontractor of any
tier, and all other persons performing any part of the Work at the Site. The Contractor shall
not permit employment of unfit persons or persons not skilled in tasks assigned to them. The
Contractor shall dismiss from its project employees and direct any Subcontractor of any tier
to dismiss from their employment on the project any person deemed by the District to be
unfit or incompetent to perform Work and thereafter, the Contractor shall not employ nor
permit the employment of such person for performance of any part of the Work without the
prior written consent of the District, which consent may be withheld in the reasonable
discretion of the District.
4.5.3 **Contractor's Superintendent and Project Manager.** The Contractor shall employ a competent superintendent, project manager and all necessary assistants who shall be in attendance at the Site at all times during performance of the Work. The Contractor's communications relating to the Work or the Contract Documents shall be through the Contractor's superintendent and/or project manager. The superintendent shall represent the Contractor at the Site and communications given to the superintendent shall be binding as if given to the Contractor. The Contractor shall dismiss from the project the superintendent, project manager or any of his/her assistants if they are deemed, in the sole reasonable judgment of the District, to be unfit, incompetent or incapable of performing the functions assigned to them. In such event, the District shall have the right to approve of the replacement superintendent, project manager or assistant.

4.5.4 **Prohibition on Harassment.**

4.5.4.1 **District's Policy Prohibiting Harassment.** The District is committed to providing a campus and workplace free of sexual harassment and harassment based on factors such as race, color religion, national origin, ancestry, age, medical condition, marital status, disability or veteran status. Harassment includes without limitation, verbal, physical or visual conduct which creates an intimidating, offensive or hostile environment such as racial slurs; ethnic jokes; posting of offensive statements, posters or cartoons or similar conduct. Sexual harassment includes without limitation the solicitation of sexual favors, unwelcome sexual advances, or other verbal, visual or physical conduct of a sexual nature.

4.5.4.2 **Contractor's Adoption of Anti-Harassment Policy.** Contractor shall adopt and implement all appropriate and necessary policies prohibiting any form of discrimination in the workplace, including without limitation harassment on the basis of any classification protected under local, state or federal law, regulation or policy. Contractor shall take all reasonable steps to prevent harassment from occurring, including without limitation affirmatively raising the subject of harassment among its employees, expressing strong disapproval of any form of harassment, developing appropriate sanctions, informing employees of their right to raise and how to raise the issue of harassment and informing complaintants of the outcome of an investigation into a harassment claim. Contractor shall require that any Subcontractor or Sub-subcontractor performing any portion of the Work to adopt and implement policies in conformity with this Article 4.5.4.

4.5.4.3 **Prohibition on Harassment at the Site.** Contractor shall not permit any person, whether employed by Contractor, a Subcontractor, Sub-subcontractor, or any other person or entity, performing any Work at or about the Site to engage in any prohibited form of harassment. Any such person engaging in a prohibited form of harassment directed to any individual performing or providing any portion of the Work at or about the Site shall be subject to appropriate sanctions in accordance with the anti-harassment policy adopted and implemented pursuant to Article 4.5.4.2 above. Any person performing or providing Work on or about the Site who engages in a prohibited form of harassment directed to any student, faculty member or staff of the District or directed to any other person on or about the Site shall be subject to immediate removal.
and shall be prohibited thereafter from providing or performing any portion of the Work. Upon the District's receipt of any notice or complaint that any person employed directly or indirectly by Contractor in performing or providing the Work has engaged in a prohibited form of harassment, the District will promptly undertake an investigation of such notice or complaint. In the event that the District, after such investigation, reasonably determines that a prohibited form of harassment has occurred, the District shall promptly notify the Contractor of the same and direct that the person engaging in such conduct be immediately removed from the Site. Unless the District's determination that a prohibited form of harassment has occurred is grossly negligent or without reasonable cause, the District shall have no liability for directing the removal of any person determined to have engaged in a prohibited form of harassment nor shall the Contract Price or the Contract Time be adjusted on account thereof. Contractor and the Surety shall defend, indemnify and hold harmless the District and its employees, officers, Board of Trustees, agents, and representatives from any and all claims, liabilities, judgments, awards, actions or causes of actions, including without limitation, attorneys' fees, which arise out of, or pertain in any manner to: (i) the assertion by any person dismissed from performing or providing work at the direction of the District pursuant to this Article 4.5.4.3; or (ii) the assertion by any person that any person directly or indirectly under the employment or direction of the Contractor has engaged in a prohibited form of harassment directed to or affecting such person. The obligations of the Contractor and the Surety under the preceding sentence are in addition to, and not in lieu of, any other obligation of defense, indemnity and hold harmless whether arising under the Contract Documents, at law or otherwise; these obligations survive completion of the Work or the termination of the Contract.

4.6 Taxes. The Contractor shall pay, without adjustment of the Contract Price, all sales, consumer, use and other taxes for the Work or portions thereof provided by the Contractor under the Contract Documents.

4.7 Permits, Fees and Notices; Compliance with Laws.

4.7.1 Payment of Permits, Fees. Unless otherwise provided in the Contract Documents, the Contractor shall secure, pay for, and include in the Contract Price the building permits, other permits, governmental fees, licenses and inspections necessary or required for the proper execution and completion of the Work.

4.7.2 Compliance with Laws. The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations and other orders of public authorities bearing on performance of the Work.

4.7.3 Notice of Variation from Laws. If the Contractor knows, or has reason to believe, that any portion of the Contract Documents are at variance with applicable laws, statutes, ordinances, building codes, regulations or rules, the Contractor shall promptly notify the District, in writing, of the same. If the Contractor performs Work knowing, or with reasonable diligence should have known, it to be contrary to laws, statutes, ordinances, building codes, rules or regulations applicable to the Work without such notice to the District, the Contractor shall assume full responsibility for such Work and shall bear the
attributable costs arising or associated therefrom, including without limitation, the removal, replacement or correction of the same.

4.8 Submittals.

4.8.1 Purpose of Submittals. Shop Drawings, Product Data, Samples and similar submittals (collectively “Submittals”) are not Contract Documents. The purpose for submission of Submittals is to demonstrate, for those portions of the Work for which Submittals are required, the manner in which the Contractor proposes to provide or incorporate such item of the Work in conformity with the information given and the design concept expressed in the Contract Documents.

4.8.2 Contractor's Submittals.

4.8.2.1 Prompt Submittals. The Contractor shall review, confirm and submit to the Architect with the number of copies of Submittals within the timeframes required by the Contract Documents. Contractor’s submission of Submittals in conformity with the Submittal Schedule is a material consideration of the Contract. In the event that the District reasonably determines that all or any portion of any Submittal fails to comply with the requirements of the Contract Documents and/or such Submittals are not otherwise complete and accurate so as to require re-submission more than one (1) time, Contractor shall bear all costs associated with the review and approval of such resubmitted Submittals; provided that such costs are in addition to, and not in lieu of, any liquidated damages imposed under the Contract Documents for Contractor's delayed submission of Submittals. Submittals not required by the Contract Documents may be returned without action. No adjustment to the Contract Time or the Contract Price shall be granted to the Contractor on account of its failure to make timely submission of any Submittals.

4.8.2.2 Approval of Contractor’s Confirmation of Submittals. All Submittals prepared by Subcontractors, of any tier, Material Suppliers, manufacturers or distributors shall bear the written approval of the Contractor thereto prior to submission to the Architect for review. Any Submittal not bearing the Contractor's written approval shall be subject to return to the Contractor for re-submittal in conformity herewith, with the same being deemed to not have been submitted. Any delay, impact or cost associated therewith shall be the sole and exclusive responsibility of the Contractor without adjustment of the Contract Time or the Contract Price.

4.8.2.3 Verification of Submittal Information. By approving and submitting Submittals, the Contractor represents to the District and Architect that the Contractor has determined and verified materials, field measurements, field construction criteria, catalog numbers and similar data related thereto and has checked and coordinated the information contained within such Submittals with the requirements of the Work and of the Contract Documents.

4.8.2.4 Information Included in Submittals. All Submittals shall be accompanied by a written transmittal or other writing by the Contractor providing an identification of the portion of the Drawings or the Specifications pertaining to the Submittal, with each
Submittal numbered consecutively for ease of reference along with the following information: (i) date of submission; (ii) project name; (iii) name of submitting Subcontractor; and (iv) if applicable, the revision number. The foregoing information is in addition to, and not in lieu of, any other information required for the Architect's review, evaluation and approval of the Contractor's Submittals.

4.8.2.5 Contractor Responsibility for Deviations. The Contractor shall not be relieved of responsibility for correcting deviations from the requirements of the Contract Documents by the Architect's approval of Submittals unless the Contractor has specifically informed the Architect in writing at the time of submission of the Submittal and the District has given written approval to the specific deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Submittals by the Architect’s approval thereof.

4.8.2.6 No Performance of Work without Approval. The Contractor shall perform no portion of the Work requiring the Architect’s review and approval of Submittals until the Architect has completed its review and granted its approval of such Submittal. The Contractor shall not perform any portion of the Work forming a part of a Submittal or which is affected by a related Submittal until the entirety of the Submittal or other related Submittal has been fully approved.

4.8.3 Architect Review of Submittals. The purpose of the Architect’s review of Submittals and the time for the Architect’s return of Submittals to the Contractor shall be as set forth elsewhere in the Contract Documents, including without limitation, Article 3.1.6 of the General Conditions. If the Architect returns a Submittal as rejected or requiring correction(s) and re-submission, the Contractor, so as not to delay the progress of the Work, shall promptly thereafter resubmit a Submittal conforming to the requirements of the Contract Documents; the resubmitted Submittal shall indicate the portions thereof modified in order to obtain the Architect's approval. When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, the Architect shall be entitled to rely upon the accuracy and completeness of such calculations and certifications accompanying Submittals. The Architect's review of the Submittals is for the limited purposes described in the Contract Documents.

4.8.4 Deferred Approval Items. In the event that any portion of the Work is designated in the Contract Documents as a "Deferred Approval" item, Contractor shall be solely and exclusively responsible for the preparation of Submittals for such item(s) in a timely manner so as not to delay or hinder the completion of the Work within the Contract Time.

4.9 Materials and Equipment.

4.9.1 Specified Materials, Equipment. Except as otherwise provided, references in the Contract Documents to any specific article, device, equipment, product, material, fixture, patented process, form, method or type of construction, by name, make, trade name, or catalog number, with or without the words "or equal" shall be deemed to establish a minimum standard of quality or performance, and shall not be construed as limiting competition.
4.9.2 Approval of Or Equal, Substitutions or Alternatives. The Contractor may propose to furnish alternatives or substitutes for a particular item specified in the Contract Documents, provided that the Contractor provides advance written notice to the District of such proposed or equal, substitution or alternative and certifies to the District that the quality, performance capability, functionality and appearance of the proposed alternative or substitute will meet or exceed the quality, performance capability, functionality, and appearance of the item or process specified, and must demonstrate to the District that the use of the substitution or alternative is appropriate and will not delay completion of the Work or result in an increase to the Contract Price. The Contractor shall submit all data to the District to permit the Architect’s proper evaluation of the proposed substitution or alternative. The Contractor shall not provide, furnish or install any substitution or alternative without the District's prior approval of the same; any alternative or substitution installed or incorporated into the Work without first obtaining the District's approval of the same shall be subject to removal pursuant to Article 12 hereof. The Architect's decision shall be final regarding the approval or disapproval of the Contractor's proposed substitutions or alternatives. In the event a substitution or alternative is approved by the District and purchase, fabrication and/or installation or such approved substitution or alternative shall be less expensive than the originally specified item, the Contract Price shall be reduced by the actual cost savings realized by the Contractor's furnishing and/or installation of such approved substitution or alternative. The Contractor shall be solely responsible for all costs and fees of the Architect, of the Architect's consultant(s) and/or governmental agencies to review and/or approve any proposed substitution or alternative. The Contractor shall be solely responsible for any increase in the cost of any approved substitution or alternative or any Work affected by such alternative or substitution. The foregoing notwithstanding, all requests for the Architect's review and approval of any proposed substitution or alternative and all engineering, construction, dimension and performance data substantiating the equivalency of the proposed substitution or alternative shall be submitted by Contractor not later than thirty-five (35) days following the date of the District's award of the Contract to Contractor by action of the District's Board of Trustees; any request for approval of proposed alternatives or substitutions submitted thereafter may be rejected summarily. The foregoing process and time limits shall apply to any proposed substitution or alternative regardless of whether the substitute or alternate item is to be provided, furnished or installed by Contractor, any Subcontractor, any Sub-Subcontractor, Material Supplier or Manufacturer.

4.9.3 Placement of Material and Equipment Orders. Contractor shall, after award of the Contract, promptly and timely place all orders for materials and/or equipment necessary for completion of the Work so that delivery of the same shall be made without delay or interruption to the timely completion of the Work. Contractor shall require that any Subcontractor of any tier performing any portion of the Work similarly place orders for all materials and/or equipment to be furnished by any such Subcontractor. Upon request of the District, the Contractor shall furnish reasonably satisfactory written evidence of the placement of orders for materials and/or equipment necessary for completion of the Work, including without limitation, orders for materials and/or equipment to be provided, furnished or installed by any Subcontractor of any tier.

4.9.4 District's Right to Place Orders for Materials and/or Equipment. If the
4.10 Safety.

4.10.1 Safety Programs. The District has implemented an Injury and Illness Prevention Program (“IIPP”) in accordance with the provisions of Labor Code §§ 3201.5 and 6401.7. If the Contractor elected at bid time to adopt the District’s IIPP pursuant to paragraph 4.2.5 of the Instructions for Bidders, Contractor shall perform the Work in accordance with the provisions of the District’s IIPP. If at bid time the District determined that the Contractor’s IIPP was instituted in accordance with Labor Code §§ 3201.5 and 6401.7, the District agrees that such IIPP may be used by the Contractor for the performance of the Work and Contractor shall perform the Work in accordance therewith. Contractor shall be solely responsible for ensuring that all Work of the Project, whether performed by the Contractor, Subcontractors or Sub-Subcontractors or others, is performed in accordance with the agreed upon IIPP for the Project and as required by applicable law, ordinance, regulation or governmental orders in connection with the performance of the Contract, or otherwise required by the type or nature of the Work, and including but not limited to the terms and conditions of the District’s OCIP Procedures Manual (Section 00650 of the Contract Documents).

4.10.2 Contractor’s/Subcontractors’ Safety Coordinators. The Contractor shall designate, and shall require each Subcontractor and Sub-Subcontractor to designate, a responsible member of that entity’s organization at the Site whose duty shall be the prevention of accidents and the implementation and maintenance of safety precautions and programs (“Safety Coordinator”). This person shall be the Contractor's, Subcontractor’s or Sub-Subcontractor’s superintendent unless otherwise designated by the Contractor, Subcontractor or Sub-Subcontractor in writing to the District.

4.10.3 Safety Precautions. The Contractor shall be solely responsible for initiating and maintaining reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to: (i) employees on the Work and other persons who may be affected thereby; (ii) the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site, under care, custody or control of the Contractor or the
Contractor's Subcontractors of any tier; and (iii) other property or items at the site of the Work, or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities whether or not designated for removal, relocation or replacement in the course of construction. The Contractor shall erect and maintain, as required by existing conditions and conditions resulting from performance of the Contract, reasonable safeguards for safety and protection of property and persons, including, without limitation, posting danger signs and other warnings against hazards, promulgating safety regulations and notifying District and users of adjacent sites and utilities. The Contractor shall give or post all notices required by applicable law and comply with applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

4.10.4 **OCIP Safety Coordinators.** In furtherance of the District’s OCIP insurance program, the District may provide one or more OCIP Safety Coordinators for the Project. Such OCIP Safety Coordinators shall be independent contractors retained by the District’s OCIP Administrator and shall be authorized to act on behalf of the District for the purpose of monitoring Contractor’s compliance with applicable safety laws, ordinances, regulations or governmental orders. No act, omission or other conduct on the part of the OCIP Safety Coordinator shall be construed to limit, restrict or relieve the Contractor from Contractor’s sole responsibility for ensuring that all Work of the Project is performed in accordance with applicable laws, ordinances, rules, regulations and lawful orders of public authorities.

4.10.5 **Safety Committee Meetings.** The Contractor’s Safety Coordinator and the Safety Coordinator of certain major Subcontractors as designated by the District shall form a Safety Committee for the Project. The Safety Committee shall attend Safety Meetings chaired by representatives of the District’s OCIP Administrator. Such meetings will generally include Site safety issues as agenda items. The purposes of the Safety Meetings include providing a formal and regular forum for discussion of safety issues and review of progress or resolution of previously raised issues and action items assigned to the Project participants. Safety meetings will be conducted at regular intervals (monthly unless otherwise expressly indicated elsewhere in the Contract Documents). Following conclusion of each Safety Meeting, the OCIP Administrator will prepare and distribute minutes reflecting the items addressed and actions taken at the meeting. Unless the Contractor notifies the OCIP Administrator in writing of objections or corrections to minutes prepared hereunder within five (5) days of the date of distribution of the minutes, the minutes as distributed shall constitute the official record of the meeting. If the Contractor timely interposes objections or notes corrections, the resolution of such matters shall be addressed at the next scheduled Safety Meeting.

4.10.6 **Site Safety Surveys.** The OCIP Safety Coordinator, in conjunction with members of the Safety Committee and representatives of the OCIP insurers, shall conduct on-Site surveys to monitor unsafe acts or unsafe conditions as determined by applicable laws, ordinances and regulations. In the event the OCIP Safety Coordinator observes an unsafe act or condition, the OCIP Safety Coordinator shall notify the Contractor’s Safety Coordinator of the observed unsafe act or unsafe condition and recommend that the item be corrected to conform to applicable laws, ordinances and regulations. Such recommendation shall not
include any direction or recommendation concerning the means, methods, techniques, sequences or procedures for correction of the item, such being the sole responsibility of the Contractor. Under no circumstances shall any recommendation, action, direction, omission or other conduct of the OCIP Safety Coordinator result in any adjustment of the Contract Price or Contract Time.

4.10.7 Emergencies. In an emergency affecting safety of persons or property, the Contractor shall promptly act to prevent threatened damage, injury or loss.


4.11.1 Use of Hazardous Materials. In the event that the Contractor, any Subcontractor or anyone employed directly or indirectly by them shall use, at the Site, or incorporate into the Work, any material or substance deemed to be hazardous or toxic under any law, rule, ordinance, regulation or interpretation thereof (collectively "Hazardous Materials"), the Contractor shall comply with all laws, rules, ordinances or regulations applicable thereto and shall exercise all necessary safety precautions relating to the use, storage or disposal thereof. Unless otherwise provided, Contractor shall be solely responsible for the transportation and disposal of any Hazardous Materials on or about the Site.

4.11.2 Prohibition on Use of Asbestos Containing Building Materials ("ACBMs"). Notwithstanding any provision of the Drawings or the Specifications to the contrary, it is the intent of the District that ACBMs not be used or incorporated into any portion of the Work. If any portion of the Work depicted in the Drawings or the Specifications shall require materials or products which the Contractor knows, or should have known with reasonably diligent investigation, to contain ACBMs, Contractor shall promptly notify the District of the same so that an appropriate alternative can be made in a timely manner so as not to delay the progress of the Work. Contractor warrants to the District that there are no materials or products used or incorporated into the Work which contain ACBMs. Whether before or after completion of the Work, if it is discovered that any product or material forming a part of the Work or incorporated into the Work contains ACBMs, the Contractor shall at its sole cost and expense remove such product or material in accordance with any laws, rules, procedures and regulations applicable to the handling, removal and disposal of ACBMs and to replace such product or material with non-ACBM products or materials and to return the affected portion(s) of the Work to the finish condition depicted in the Drawings and Specifications relating to such portion(s) of the Work. Contractor's obligations under the preceding sentence shall survive the termination of the Contract, the warranty period provided under the Contract Documents, the Contractor's completion of the Work or the District's acceptance of the Work. In the event that the Contractor shall fail or refuse, for any reason, to commence the removal and replacement of any material or product containing ACBMs forming a part of, or incorporated into the Work, within ten (10) days of the date of the District's written notice to the Contractor of the existence of ACBM materials or products in the Work, the District may thereafter proceed to cause the removal and replacement of such materials or products in any manner which the District determines to be reasonably necessary and appropriate; all costs, expenses and fees, incurred by the District in connection with such removal and replacement shall be the responsibility of the Contractor and the Contractor's Performance Bond Surety.
4.11.3 Encountering of Hazardous Materials. If the Contractor encounters Hazardous Materials at the Site which have not been rendered harmless or for which there is no provision in the Contract Documents for their containment, removal, abatement or handling, the Contractor shall immediately stop the Work in the affected area and shall immediately notify the District, in writing, of such condition. The Contractor shall diligently proceed with the Work in all other unaffected areas. The Contractor shall proceed with the Work in the affected area only after the Hazardous Materials have been rendered harmless, contained, removed or abated. Adjustments, if any, to the Contract Time or Price shall be made in accordance with Articles 7 and 9.

4.11.4 Material Safety Data Sheets. Contractor is required to insure that Material Safety Data Sheets (MSDS) for any material requiring a MSDS pursuant to the federal “hazard communication” standard or employee’s right-to-know law are available in a readily accessible place on the Work premises. The Contractor is also required to insure (i) the proper labeling of any substance brought onto the Work premises, and (ii) that the persons working with the material, or within the general area of the material, are informed about the hazards of the substance and follow proper handling and protection procedures.

4.11.5 Compliance with Proposition 65. Contractor is required to comply with the provisions of California Health and Safety Code § 25249.5, et seq., which requires the posting and giving of notice to persons who may be exposed to any chemical known to the State of California to cause cancer. The Contractor agrees to familiarize itself with such statutory provisions and to fully comply with the requirements set forth therein.

4.12 Maintenance of Documents.

4.12.1 Documents at Site. The Contractor shall maintain at the Site: (i) one record copy of the Drawings, Specifications and all addenda thereto; (ii) Change Orders approved by the District and all other modifications to the Contract Documents; (iii) Submittals reviewed by the Architect; (iv) Requests for Information and responses thereto; (v) Record Drawings; (vi) Material Safety Data Sheets (“MSDS”) accompanying any materials, equipment or products delivered or stored at the Site or incorporated into the Work; and (vii) all building and other codes or regulations applicable to the Work, including without limitation, Title 24, Part 2 of the California Code of Regulations. During performance of the Work, all documents maintained by Contractor at the Site shall be available to the District, the Construction Manager, the Architect, the District’s Inspector and DSA for review, inspection or reproduction. Upon completion of the Work, all documents maintained at the Site by the Contractor pursuant to the foregoing, except for (vii), shall be assembled and transmitted to the District.

4.12.2 Maintenance of Record Documents. During its performance of the Work, the Contractor shall continuously maintain Record Documents which are marked to indicate all field changes made to adapt the Work depicted in the Documents to field conditions, changes resulting from Change Orders and all concealed or buried installations, including without limitation, piping, conduit and utility services. The Record Documents shall be clean and all changes, corrections and dimensions shall be marked in a neat and legible manner in a contrasting color. The District’s inspection or review shall not be deemed to be the District's
approval or verification of the completeness or accuracy of the Record Documents. The failure or refusal of the Contractor to continuously maintain complete and accurate Record Documents or to make available the Record Documents for inspection and review by the District may be deemed by the District to be Contractor's default of a material obligation hereunder. Payments to the Contractor are conditioned upon continuous maintenance and completion of the Record Documents pursuant to Articles 8.3.2 and 8.3.3. If the Contractor fails or refuses to continuously maintain the Record Documents in a complete and accurate manner, the District may take appropriate action to cause such maintenance, and all costs incurred in connection therewith shall be charged to the Contractor; the District may deduct such costs from any portion of the Contract Price then or thereafter due the Contractor.

4.13 Use of Site. The Contractor shall confine operations at the Site to areas permitted by law, ordinances or permits, subject to any restrictions or limitations set forth in the Contract Documents. The Contractor shall not unreasonably encumber the Site or adjoining areas with materials or equipment. The Contractor shall be solely responsible for providing security at the Site with all such costs included in the Contract Price. The District shall at all times have access to the Site.

4.14 Noise and Dust Control. The Contractor shall be responsible for complying with the requirements of the city and county having jurisdiction with regard to noise ordinances governing construction sites and activities. Construction equipment noise is subject to the control of the Environmental Protection Agency’s Noise Control Program (Code of Federal Regulations, Title 40, Part 204). The Contractor shall be solely responsible for maintaining all areas of the Work free from all materials and products that by becoming airborne may cause respiratory inconveniences to District students and personnel. Damages and/or any liability derived from the Contractor’s failure to comply with these requirements shall be the sole cost of the Contractor, including all penalties incurred for violations of local, state and/or federal regulations.

4.14.1 The Contractor shall be fully and solely responsible for maintaining and up keeping all areas of the Work and Project Premises, outdoors and indoors, free from flying debris, grinding powder, sawdust, dirt and dust in general as well as any other product, product waste or work waste, that by becoming airborne may cause respiratory inconveniences to persons, particularly to students and District personnel. Additionally, the Contractor shall take specific care to avoid deposits of airborne dust or other elements that may accumulate on top of equipment, on walls, on floors, furniture and/or any other permanent or movable items. Prior to the commencement of any Work, the Contractor shall determine the probabilities of creating such an environment and provide all of the necessary protective equipment and/or items to contain the dust or airborne elements under a complete and secured control. Such protection devices, systems or methods shall be in accordance with the regulations set forth by the EPA and OSHA, and other applicable; State and/or Federal regulations. Additionally, the Contractor shall be the sole party responsible to clean up and remove any and all deposits of dust and other elements. Damages and/or any liability derived from the Contractor's failure to comply with these requirements shall be exclusively the cost of the Contractor, including, without limitation, any and all penalties that may be incurred for violations of local, state and/or federal regulations, and any amounts expended by the District to pay such damages shall be due and payable to the District. The District may also retain or withhold any amounts expended hereunder from progress payments otherwise due Contractor in accordance with the Contract Documents. Contractor shall protect all of the District's property, fixed or movable, and
shall replace any damaged item or part thereof and professionally clean any end all items that might became covered or partially covered to any degree by dust or other airborne elements. If school is in session at any point during the progress of the Project, and, in the District's reasonable discretion, (lying debris, grinding powder, sawdust, dirt or dust from any Work disrupts or disturbs the students or faculty or the normal operation of the school, at the District's request, the Contractor shall schedule the performance of all such Work around normal school hours or make other arrangements so that the Work does not cause such disruption or disturbance. In no event shall Contractor have a right to receive additional compensation or an extension to the Contract Time as a result of any such rescheduling or the making of such other arrangements.

In the event that the Contractor fails to comply with the requirements for dust control, noise control, or any other maintenance or clean up requirement of this Contract, the District shall so notify the Contractor and the Contractor shall be obligated to take immediate action. Should the Contractor fail to respond with immediate and responsive action and not later than twenty-four (24) hours from the District's notification, the District shall have the absolute right to proceed as it may deem necessary to remedy such matter. Any and all costs incurred in connection with such actions shall be the sole responsibility of, and be borne by, Contractor.

4.15 Cutting and Patching. The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make the component parts thereof fit together properly in accordance with the Contract Documents. Only tradespersons skilled and experienced in cutting and patching shall perform such work. The Contractor shall not damage or endanger any portion of the Work, or the fully or partially completed construction of the District or separate contractors by cutting, patching, excavation or other alteration. The Contractor shall not cut, patch or otherwise alter the construction by the District or separate contractor without the prior written consent of the District or separate contractor thereto, which consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold consent to the request of the District or separate contractor to cut, patch or otherwise alter the Work.

4.16 Clean-Up. The Contractor shall at all times keep the Site and all adjoining areas free from the accumulation of any waste material, rubbish or excess materials and equipment, placed, caused by performance of the Work. The Contractor shall maintain the Site in a "rake-clean" standard on a daily basis. Prior to completion of the Work, Contractor shall remove from the Site all rubbish, waste and excess material, tools, Construction Equipment, machinery, temporary facilities and barricades, and any other items which are not the property of the District under the Contract Documents. Upon completion of the Work, the Site and all adjoining areas shall be left in a neat and broom clean condition satisfactory to District. The Construction Manager is authorized to direct the Contractor's clean-up obligations hereunder. If the Contractor fails to clean up as provided for in the Contract Documents, the District may do so, and all costs incurred in connection therewith shall be charged to the Contractor; the District may deduct such costs from any portion of the Contract Price then or thereafter due the Contractor.

4.17 Access to the Work. The Contractor shall provide the DSA, the District, the LCP administrator, the Construction Manager, the District's Inspector, the Architect and the Architect's consultant(s) with access to the Work, whether in place, preparation and progress and wherever located.

4.18 Information for the District's Inspector. The Contractor shall furnish the District's
Inspector access to the Work for obtaining such information as may be necessary to keep the District's Inspector fully informed respecting the progress, quality and character of the Work and materials, equipment or other items incorporated therein.

4.19 Inspector’s Field Office. The Contractor shall provide and include in the Contract Price a temporary furnished office at the Site as specified in the Special Conditions or elsewhere in the Contract Documents, for use by the District, the Construction Manager and the District's Inspector, until removal of the same is authorized by the District.

4.20 Patents and Royalties. The Contractor and the Surety shall defend, indemnify and hold harmless the District and its agents, employees and officers from any claim, demand or legal proceeding arising out of or pertaining, in any manner, to any actual or claimed infringement of patent rights in connection with performance of the Work under the Contract Documents.

4.21 Prevailing Wage Rates; Employment of Labor.

4.21.1 Determination of Prevailing Rates. Pursuant to the provisions of Division 2, Part 7, Chapter 1, Article 2 of the California Labor Code at §§1770 et seq., the District has obtained from the Director of the Department of Industrial Relations the general prevailing rate of per diem wages and the prevailing rate for holiday and overtime work in the locality in which the Work is to be performed. These rates are on file at the District’s principal office. The Contractor shall post, at appropriate and conspicuous locations on the Site, a schedule showing all determined general prevailing wage rates.

4.21.2 Payment of Prevailing Rates. This Project is a public works project as defined in Labor Code §1720, and must be performed in accordance with the requirements of Labor Code §§1720 to 1815 and Title 8 California Code of Regulations §§16000 to 17270, which govern the payment of prevailing wage rates on public works projects. The Contractor, and any Subcontractor, of any tier, shall pay their workers engaged in the Work not less than the general prevailing wage rate, regardless of any contractual relationship which may be alleged to exist between the Contractor or any Subcontractor, of any tier, and such worker. Contractor, consistent with California Public Contract Code §6109, is prohibited from performing a portion of work with a Subcontractor who is debarred pursuant to Labor Code §§1777.1 or 1777.7.

4.21.3 Prevailing Wage Penalty. The Contractor shall, as a penalty, forfeit up to Fifty Dollars ($50.00) to the District for each calendar day or portion thereof, for each worker paid less than the prevailing rates as determined by the Director of the Department of Industrial Relations for such work or craft in which such worker is employed for the Work by the Contractor or by any Subcontractor, of any tier. Pursuant to California Labor Code §1775, the difference between prevailing wage rates and the amount paid to each worker each calendar day, or portion thereof, for which each worker paid less than the prevailing wage rate, shall be paid to each worker by the Contractor.

4.21.4 Sufficient Contract Price. Contractor represents and warrants that the Contract Price includes sufficient funds to allow Contractor and all Subcontractors to comply with all applicable laws and contractual agreements. Contractor shall defend, indemnify and hold the District harmless from and against any and all claims, demands, losses, liabilities and
damages arising out of or relating to the failure of Contractor or any Subcontractor to comply with any applicable law in this regard, including, but not limited to Labor Code §2810. Contractor agrees to pay any and all assessments, including wages, penalties, forfeitures and liquidated damages, made or asserted against the District in relation to any such failure.

4.21.5 Payroll Records.

4.21.5.1 Submission of Certified Payroll Records to District. Pursuant to California Labor Code §1776, the Contractor and each Subcontractor, of any tier, shall keep an accurate certified payroll record, 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 person employed for the Work. If there is no work in a given week or on a given day, Contractor and each Subcontractor must keep a certified Non-Performance payroll record, indicating “no work” for that week or day(s). Contractor shall submit all certified payroll records to the Program Manager in complete, unredacted form with an original signature on the Statement of Compliance along with, and as a condition to, its Application for Payment.

4.21.5.2 Inspection of Certified Payroll Records. Additionally, the certified payroll records shall be available for inspection at all reasonable hours at the principal office of the Contractor on the following basis: (i) a certified copy of an employee's payroll record shall be made available for inspection or furnished to such employee or his/her authorized representative on request; (ii) a certified copy of all payroll records shall be made available for inspection or furnished upon request to the District, the Division of Labor Standards Enforcement and the Division of Apprenticeship Standards of the Department of Industrial Relations; (iii) a certified copy of all payroll records shall be made available upon request to the public for inspection or copies thereof made; provided, however, that a request by the public shall be made through either the District, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided, the requesting party shall, prior to being provided the records, reimburse the cost of preparation by the Contractor, Subcontractors and the entity through which the request was made.

The public shall not be given access to such records at the principal office of the Contractor; (iv) the Contractor shall file a certified copy of the payroll records with the entity that requested such records within ten (10) days after receipt of a written request; (v) any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the District, the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address and social security number. The name and address of the Contractor or any Subcontractor, of any tier, performing a part of the Work shall not be marked or obliterated. The Contractor shall inform the District of the location of payroll records, including the street address, city and county and shall, within five (5) working days, provide a notice of a change or location and address.

4.21.5.3 Submission of Payroll Records. Contractor shall provide, and shall cause all Subcontractors to provide, payroll records as defined in Title 8 California Code of
Regulations §16000 to the District, within ten (10) days of written request, at no cost to the District. The District will not return documents to Contractor.

4.21.5.4 Penalty For Noncompliance. In the event of noncompliance with the requirements of this Article 4.21.5, the Contractor shall have ten (10) days in which to comply, subsequent to receipt of written notice specifying in what respects the Contractor must comply herewith. Should noncompliance still be evident after such 10-day period, the Contractor shall, as a penalty to the District, forfeit Twenty-Five Dollars ($25.00) 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, such penalties shall be withheld from any portion of the Contract Price then or thereafter due the Contractor. The responsibility for compliance with the foregoing provisions shall rest upon the Contractor.

4.21.5.5 Liquidated Damages. Should Contractor neglect, fail or refuse to submit any documents pursuant to this Article 4.21.5, Contractor agrees to pay to the District the sum of twenty-five ($25) dollars per worker per day in liquidated damages, not as a penalty but as liquidated damages, for every day beyond ten (10) days after such documents are due. The liquidated damages amounts are agreed upon by and between the Contractor and the District because of the difficulty of fixing the District’s actual damages in the event of failure to submit such documents. The Contractor and District specifically agree that said amounts are reasonable estimates of the District’s damages in such event, and that such amounts do not constitute a penalty. The Contractor and District acknowledge and agree that the liquidated damages contained in this provision are reasonable under the circumstances existing at the time of the Contractor’s execution of the Contract.

4.21.6 Hours of Work.

4.21.6.1 Limits on Hours of Work. Pursuant to California Labor Code §1810, eight (8) hours of labor shall constitute a legal day’s work. Pursuant to California Labor Code §1811, the time of service of any worker employed at any time by the Contractor or by a Subcontractor, of any tier, upon the Work or upon any part of the Work, is limited and restricted to eight (8) hours during any one calendar day and forty (40) hours during any one calendar week, except as hereafter provided. Notwithstanding the foregoing provisions, Work performed by employees of Contractor or any Subcontractor, of any tier, in excess of eight (8) hours per day and forty (40) hours during any one week, shall be permitted upon compensation for all hours worked in excess of eight (8) hours per day at not less than one and one-half (1½) times the basic rate of pay.

4.21.6.2 Penalty for Excess Hours. The Contractor shall pay to the District a penalty of Twenty-five Dollars ($25.00) for each worker employed on the Work by the Contractor or any Subcontractor, of any tier, for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any calendar day and forty (40) hours in any one calendar week, in violation of the provisions of Labor Code §1810 et seq.

4.21.6.3 Contractor Responsibility. Any Work performed by workers necessary to
be performed after regular working hours or on Sundays or other holidays shall be performed without adjustment to the Contract Price or any other additional expense to the District.

4.21.7 Apprentices.

4.21.7.1 Employment of Apprentices. Labor Code §1777.5 and Title 8 California Code of Regulations §200 et seq. provide detailed requirements for employing apprentices on public works projects. Contractor is responsible for compliance with Labor Code §1777.5 and applicable regulations on the Project. This responsibility includes, but is not limited to, the obligation to employ properly registered apprentices and pay such apprentices at least the prevailing wage rate for their appropriate apprentice classification. Only apprentices, as defined in California Labor Code §3077 who are in training under apprenticeship standards and written apprenticeship agreements under California Labor Code §§3070 et seq. are eligible to be employed for the Work. The employment and training of each apprentice shall be in accordance with the provisions of the apprenticeship standards and apprentice agreements under which such apprentice is training. Any apprentices employed to perform any of the Work shall be paid the standard wage paid to apprentices under the regulations of the craft or trade for which such apprentice is employed, and such individual shall be employed only for the work of the craft or trade to which such individual is registered. This Article 4.21.7 shall not apply to contracts of general contractors, or to contracts of specialty contractors not bidding for work through a general or prime contractor, when the contract involves less than Thirty Thousand Dollars ($30,000.00). The term "Apprenticeable Craft or Trade," as used herein shall mean a craft or trade determined as an apprenticeable occupation in accordance with rules and regulations prescribed by the Apprenticeship Council.

4.21.7.2 Apprenticeship Certificate. When the Contractor or any Subcontractor, of any tier, in performing any of the Work employs workers in any Apprenticeable Craft or Trade, the Contractor and such Subcontractor shall apply to the Joint Apprenticeship Committee administering the apprenticeship standards of the craft or trade in the area of the site of the Work for and obtain a certificate approving the Contractor or such Subcontractor under the apprenticeship standards for the employment and training of apprentices in the area or industry affected, provided, however, that the approval as established by the Joint Apprenticeship Committee or Committees shall be subject to the approval of the Administrator of Apprenticeship. Contractors or Subcontractors shall not be required to submit individual applications for approval to local Joint Apprenticeship Committees provided they are already covered by the local apprenticeship standards for that craft or trade.

4.21.7.3 Contract Award Information. Contractor shall submit contract award information using the Division of Apprenticeship Standards (DAS 140) Form to the applicable apprenticeship committee within ten (10) days of the date of execution of contract and no later than the first day of work as per Title 8 California Code of Regulations §230. Contractor shall submit a copy of the completed DAS 140 Form to the District’s Labor Compliance Program at the same time.
4.21.7.4 Ratio of Apprentices to Journeymen. The ratio of Work performed by apprentices to journeymen, who shall be employed in the Work, may be no higher than the ratio stipulated in the apprenticeship standards under which the Joint Apprenticeship Committee operates, but in no case shall the ratio be less than one hour of apprentice work for each five hours of labor performed by a journeyman, except as otherwise provided in California Labor Code §1777.5. Any ratio shall apply during any day or portion of a day when any journeyman is employed at the site of the Work and shall be computed on the basis of the hours worked during the day by journeymen so employed. The Contractor shall employ apprentices for the number of hours computed as above before the end of the Contract, and Subcontractors before the end of the subcontract. The Contractor shall, however, endeavor, to the greatest extent possible, to employ apprentices during the same time period that the journeymen in the same craft or trade are employed at the site of the Work. Any Work performed by a journeyman in excess of eight hours per day or 40 hours per week shall not be used to calculate the hourly ratio required by this Article. Where an hourly apprenticeship ratio is not feasible for a particular craft or trade, the Division of Apprenticeship Standards, upon application of an apprenticeship committee, may order a minimum ratio of not less than one apprentice for each five journeymen in a craft or trade classification. Upon proper showing by the Contractor or Subcontractor that it employs apprentices in such craft or trade in the State of California on all of its contracts on an annual average of not less than one apprentice to each five journeymen, the Division of Apprenticeship Standards may grant a certificate exempting the Contractor from the 1-to-5 ratio as set forth in this Article and California Labor Code §1777.5.

4.21.7.5 Exemption from Ratios. The Joint Apprenticeship Committee shall have the discretion to grant a certificate, which shall be subject to the approval of the Administrator of Apprenticeship, exempting the Contractor from the 1-to-5 ratio set forth in this Article when it finds that any one of the following conditions are met: (i) unemployment for the previous three-month period in such area exceeds an average of fifteen percent (15%) or; (ii) the number of apprentices in training in such area exceeds a ratio of 1-to-5 in relation to journeymen, or; (iii) the Apprenticeable Craft or Trade is replacing at least one-thirtieth (1/30) of its journeymen annually through apprenticeship training, either on a statewide basis or on a local basis, or; (iv) if assignment of an apprentice to any Work performed under a public works contract would create a condition which would jeopardize such apprentice's 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 journeyman. When such exemptions from the 1-to-5 ratio between apprentices and journeymen are granted to an organization which represents contractors in a specific trade on a local or statewide basis, the member contractors will not be required to submit individual applications for approval to local Joint Apprenticeship Committees, provided they are already covered by the local apprenticeship standards.

4.21.7.6 Contractor's Compliance. The responsibility of compliance with this Article for all Apprenticeable Trades or Crafts is that of the Contractor. In the event the Contractor knowingly fails to comply with the provisions of this Article and California
Labor Code §1777.5, pursuant to California Labor Code §1777.7, the Contractor shall forfeit, as a civil penalty, not more than One Hundred Dollars ($100.00) for each calendar day of noncompliance. A contractor or subcontractor that knowingly commits a second or subsequent violation of this Article and California Labor Code §1777.5 shall forfeit as a civil penalty not more than Three Hundred Dollars ($300.00) for each calendar day of noncompliance. Notwithstanding the provisions of California Labor Code §1727, upon receipt of a determination that a civil penalty has been assessed by the Chief of the Division of Apprenticeship Standards, the District shall withhold such amount from the Contract Price then due or to become due. In the event a Contractor or Subcontractor is determined by the Chief to have knowingly committed a serious violation of Labor Code §1777.5, the Chief may also deny the Contractor or Subcontractor and its responsible officers the right to be on or be awarded or perform work as a subcontractor on any public works contract for a period of up to one (1) year for a first violation and up to three (3) years for a second or subsequent violation.

4.21.8 Employment of Independent Contractors. Pursuant to California Labor Code §1021.5, Contractor shall not willingly and knowingly enter into any agreement with any person, as an independent contractor, to provide any services in connection with the Work where the services provided or to be provided requires that such person hold a valid contractors license issued pursuant to California Business and Professions Code §§7000 et seq. and such person does not meet the burden of proof of his/her independent contractor status pursuant to California Labor Code §2750.5. In the event that Contractor shall employ any person in violation of the foregoing, Contractor shall be subject to the civil penalties under California Labor Code §1021.5 and any other penalty provided by law. In addition to the penalties provided under California Labor Code §1021.5, Contractor's violation of this Article 4.21.8 or the provisions of California Labor Code §1021.5 shall be deemed an event of Contractor's default under Article 15.1 of these General Conditions. The Contractor shall require any Subcontractor of any tier performing or providing any portion of the Work to adhere to and comply with the foregoing provisions.

4.22 Labor Compliance Program. Pursuant to California Labor Code §1771.7, District has implemented a Labor Compliance Program, initially approved on April 9, 2003. Contractor shall post “Notice of Initial Approval” of the District's Labor Compliance Program at the Site in accordance with 8 California Code of Regulations §16429. The Labor Compliance Program includes, without limitation, provisions requiring Contractor to comply with the prevailing rates of wages, maintenance and submission of weekly certified payroll records, employment of apprentices and, compliance with legal hours of work, and debarment. Contractor, and any Subcontractors, are required to comply with the requirements of the Labor Compliance Program, at no additional cost to District. Contractor shall include, and shall require the Subcontractors to include, contractual provisions in all contracts they enter into for the performance of the Work, requiring each Subcontractor, of every tier, who furnishes any labor for the performance of Work, to comply with these provisions at no additional cost. Contractor and all Subcontractors shall comply with California Labor Code §§1720-1781, applicable regulations and the Labor Compliance Program, and shall pay appropriate penalties for failure to comply pursuant to the California Labor Code, including, but not limited to, Sections 1775, 1776, 1777.7 and 1813, and the Labor Compliance Program. Contractor will be responsible for all failures by all Subcontractors, to comply with the
District’s LCP requirements. Contractor shall attend any pre-construction meetings held by the District and/or its Labor Compliance Program to discuss labor requirements. Contractor and the Subcontractors shall allow the District, its Labor Compliance Program, the Department of Industrial Relations and designated representatives of each to conduct worker interviews at the Site during working hours. Compliance by Contractor with the requirements of this Article shall be a condition to Contractor’s right to payment under its Applications for Payment. For questions or assistance concerning the Labor Compliance Program, please contact Ben Ocasio or Sophia Espinoza of The Solis Group, 234 N. El Molino Avenue, Suite 202, Pasadena, CA 91101, (626) 685-6989.

4.23 Not Applicable

4.24 Assignment of Antitrust Claims. Pursuant to California Public Contract Code §7103.5, the Contractor and its Subcontractor(s), of any tier, hereby offers and agrees to assign to the District all rights, title and interest in and to all causes of action they may have under Section 4 of the Clayton Act, (15 U.S.C. §15) or under the Cartwright Act (California Business and Professions Code §§16700 et seq.), arising from purchases of goods, services or materials hereunder or any Subcontract. This assignment shall be made and become effective at the time the District tenders Final Payment to the Contractor, without further acknowledgment by the parties. If the District receives, either through judgment or settlement, a monetary recovery in connection with a cause of action assigned under California Public Contract Code §7103.5, the assignor thereof shall be entitled to receive reimbursement for actual legal costs incurred and may, upon demand, recover from the District any portion of the recovery, including treble damages, attributable to overcharges that were paid by the assignor but were not paid by the District as part of the Contract Price, less the expenses incurred by the District in obtaining that portion of the recovery. Upon demand in writing by the assignor, the District shall, within one year from such demand, reassign the cause of action assigned pursuant to this Article if the assignor has been or may have been injured by the violation of law for which the cause of action arose: and (i) the District has not been injured thereby; or (ii) the District declines to file a court action for the cause of action.

ARTICLE 5: SUBCONTRACTORS

5.1 Subcontracts. Any Work performed for the Contractor by a Subcontractor shall be pursuant to a written agreement between the Contractor and such Subcontractor which specifically incorporates by reference the Contract Documents and which specifically binds the Subcontractor to the applicable terms and conditions of the Contract Documents. The foregoing notwithstanding, no contractual relationship shall exist, or be deemed to exist, between any Subcontractor and the District, unless the Contract is terminated and District, in writing, elects to assume the Subcontract. Each Subcontract for a portion of the Work shall provide that such Subcontract may be assigned to the District if the Contract is terminated by the District pursuant to Article 15.1 hereof, subject to the prior rights of the Surety obligated under a bond relating to the Contract. Upon request, the Contractor shall provide to the District copies of executed Subcontracts and Purchase Orders, including amendment thereto, to which Contractor is a party within seven (7) days of District’s request for same. The Contractor's failure or refusal, for any reason, to provide copies of such Subcontracts or Purchase Orders shall be deemed the Contractor's default of a material term of the Contract Documents.
5.2 Substitution of Listed Subcontractor.

5.2.1 Substitution Process. Any request of the Contractor to substitute a listed Subcontractor will be considered only if such request is in strict conformity with this Article 5.2 and California Public Contract Code §4107. All costs and fees incurred by the District in the review and evaluation of a request to substitute a listed Subcontractor shall be borne by the Contractor; such costs and fees may be deducted by the District from the Contract Price then or thereafter due the Contractor.

5.2.2 Responsibilities of Contractor Upon Substitution of Subcontractor. Neither the substitution nor the District's consent to Contractor's substitution of a listed Subcontractor shall relieve Contractor from its obligation to complete the Work within the Contract Time and for the Contract Price. In the event that the District determines that revised or additional Submittals are required of the newly substituted Subcontractor, the District shall promptly notify the Contractor, in writing, of such requirement and the time for submittal. In the event that the revised or additional Submittals are not submitted by Contractor within the time specified, Contractor shall be subject to the per diem assessments for late Submittals as set forth in Article 4.8 of these General Conditions. Any revised or additional Submittals required pursuant to this Article 5.2.2 shall conform with the requirements of Article 4.8 of these General Conditions. Contractor shall reimburse the District for all fees and costs incurred or associated with the processing, review and evaluation of any revised or additional Submittals required pursuant to this Article 5.2.2; the District may deduct such fees and costs from any portion of the Contract Price then or thereafter due the Contractor. In the event that additional or revised Submittals are required pursuant to this Article 5.2.2, such requirement shall not result in an increase to the Contract Time or the Contract Price.

5.3 Subcontractors' Work. Whenever the Work of a Subcontractor is dependent upon the Work of the Contractor or another Subcontractor, the Contractor shall require the Subcontractor to: (a) coordinate its Work with the dependent Work; (b) provide necessary dependent data and requirements; (c) supply and/or install items to built into the dependent Work of others; (d) make appropriate provisions for dependent Work of others; (e) carefully examine and understand the portions of the Contract Documents (including Drawings, Specifications and Field Clarifications) and Submittals relating to the dependent Work; and (f) examine the existing dependent Work and verify that the dependent Work is in proper condition for the Subcontractor's Work. If the dependent Work is not in a proper condition, the Subcontractor shall notify the Contractor in writing and not proceed with the Subcontractor's Work until the dependent Work has been corrected or replaced and is in a proper condition for the Subcontractor's Work.

ARTICLE 6: INSURANCE; INDEMNITY; BONDS

6.1 Not Applicable
6.2 Not Applicable
6.3 Not Applicable
6.4 Not Applicable
6.12 Insurance Provided by Contractor / Subcontractors. The Contractor shall, for the duration of the Contract, provide and maintain insurance and shall require each Subcontractor and Sub-Subcontractor (except Excluded Parties covered under Article 6.18) to provide and maintain insurance of the type and in the limits as set forth below and in the Supplemental Conditions (“Non-OCIP Insurance”). Except as otherwise provided in Article 6.2.4, the Non-OCIP Insurance is intended to cover employee injury, personal injury, bodily injury and property damage liability for work performed away from the Project Site and for Work of the Project performed after Final Acceptance. Such insurance shall name the parties required to secure same as insureds and shall be in a form and through issuing companies acceptable to the District. Such insurance may be provided in single policy or multiple policies (primary and excess), including an umbrella form. Such insurance shall contain a defense of suits provision and shall provide the coverages set forth in this Article 6.12 under the following conditions:

(a) Notwithstanding any inconsistent statement in the policies obtained by Contractor, Subcontractors or Sub-Subcontractors, or any endorsement or certificate attached thereto, it is agreed that the District, its officers, agents, employees and representatives, the Construction Manager, the Architect, the IOR and the OCIP Administrator, and their respective officers, agents, employees and representatives, are additional insureds (for all coverages except Workers’ Compensation / Employer’s Liability), and that coverage is provided for all operations, uses, occupation, acts and activities of such insureds under the Contract Documents, as may be amended or adjusted, regardless of whether liability is attributable to the insured or a combination of the insured and one or more additional insureds. Upon District’s request, the Contractor, Subcontractors and Sub-Subcontractors shall provide endorsements evidencing such coverage for such additional insureds.

(b) The coverage provided by the policies obtained by Contractor, Subcontractors or Sub-Subcontractors is primary coverage and non-contributing with other insurance, if any, carried by the District, its officers, agents, employees and representatives, the Construction Manager, Architect, IOR or OCIP Administrator, and their respective officers, agents, employees and representatives, as to operations or work away from the Project Site or after Final Acceptance, except for automobile liability which is primary and non-contributing with other insurance carried by the District, Construction Manager, Architect, IOR or OCIP Administrator. All such additional insured endorsements issued thereon shall be so endorsed.
(c) In the event one of the insureds incurs liability to any other of the insureds, these policies shall provide protection for each insured against whom claim is or may be made, including claims by other insureds in the same manner as if separate policies had been issued to each insured.

(d) Notice of occurrences or claims under the policies shall be made to the District's Representative.

6.12.1 Workers’ Compensation/Employer's Liability Insurance. The Contractor shall provide and shall require each Subcontractor and Sub-Subcontractor (except Excluded Parties covered under Article 6.18) to provide Workers’ Compensation/Employer’s Liability insurance in the statutory limits of the workers’ compensation laws of the State of California, including Coverage B – Employers Liability, in an amount not less than that specified in the Supplemental Conditions, for Project-related operations occurring away from the Project Site and for Work of the Project after Final Acceptance.

6.12.2 Commercial General Liability Insurance. The Contractor shall provide and shall require each Subcontractor and Sub-Subcontractor (except Excluded Parties covered under Article 6.18) to provide Commercial General Liability insurance (including products liability for any product manufactured, assembled or otherwise worked upon away from the Project Site) in a form providing coverage not less than that of a Standard Commercial General Liability insurance policy (occurrence form) for all operations of the party required to furnish same, including hazards of operations (including explosion, collapse and underground coverage), elevators, independent contractors, employees as additional insureds, completed operations, with contractual liability coverage (for contracts related to the Work), personal injury liability and excess Employer's Liability, for personal injury, bodily injury and property damage arising out of the Work, for operations away from the Project Site and after Final Acceptance in policies of insurance with limits in an amount not less than that specified in the Supplemental Conditions.

6.12.3 Automobile Liability Insurance. The Contractor shall provide and shall require each Subcontractor and Sub-Subcontractor (except Excluded Parties covered under Article 6.18) to provide Automobile Liability insurance covering all owned, non-owned and hired automobiles, trucks, and trailers of the Contractor, Subcontractors and Sub-Subcontractors. Such insurance shall provide coverage not less than that of the Standard Comprehensive Automobile Liability policy with limits not less than that specified in the Supplemental Conditions for occurrences both at and away from the Project Site.

6.12.4 Aircraft Liability Insurance. If aircraft are used by the Contractor, Subcontractors, Sub-Subcontractors or anyone else on their behalf, such Contractor, Subcontractor, Sub-Subcontractor or other entity shall maintain or cause the operator of the aircraft to maintain aircraft public liability insurance insuring passengers and the general public against personal injury, bodily injury or property damage arising from aircraft owned, used, operated or hired in connection with the work of the Contractor, Subcontractor, Sub-Subcontractor or anyone else, with limits in an amount not less than that specified in the Supplemental Conditions.

6.13 Evidence of Contractor's Non-OCIP Insurance. Concurrently with delivery of the executed Contract, Contractor shall deliver to the District Certificates of Insurance evidencing the
Contractor’s Non-OCIP Insurance coverage required by Article 6.12. Failure or refusal of the Contractor to so deliver Certificates of Insurance may be deemed by the District to be a default of a material obligation of the Contractor under the Contract Documents, and thereupon the District may proceed to exercise any right or remedy provided for under the Contract Documents or at law. Under no circumstances shall Contractor commence Work at the Site without having submitted to the District Certificates of Insurance for all Non-OCIP Insurance provided by the Contractor. Contractor’s failure to timely provide the District with all Non-OCIP Certificates of Insurance shall not result in any adjustment of the Contract Price or Contract Time. The Certificates of Insurance and the insurance policies required by Article 6.12 shall contain a provision that coverage afforded under such policies will not be canceled or allowed to expire without at least sixty (60) days’ prior written notice by registered mail addressed to: Rio Hondo Community College District, 3600 Workman Mill Road, Whittier, California 90601, attention Timothy Connell, Director, Contract Management and Vendor Services. Should any policy of insurance required under Article 6.12 be canceled and the Contractor fails to immediately procure replacement insurance as required, the District reserves the right to procure such insurance and to deduct the premium cost thereof and other costs incurred by the District in connection therewith from any sum then or thereafter due the Contractor under the Contract Documents. Upon District’s request, the Contractor shall furnish satisfactory proof of coverage of each type of Non-OCIP Insurance required by the Contract Documents, including copies of the insurance policies or renewals or replacements in form and content acceptable to the District; failure of the Contractor to comply with the District’s request may be deemed to be a default of a material obligation of the Contract Documents.

6.14 Evidence of Subcontractors’ Non-OCIP Insurance. Contractor shall require that every Subcontractor or Sub-Subcontractor (except Excluded Parties covered under Article 6.18) obtain and maintain the policies of insurance set forth in Articles 6.12.1 through 6.12.4 herein. The limits of liability of such policies shall be as set forth in the Supplemental Conditions. Each of the policies of insurance obtained and maintained by a Subcontractor or Sub-Subcontractor hereunder shall conform to the requirements of Article 6.12. Upon request of the District, Contractor shall promptly deliver Certificates of Insurance evidencing that the Subcontractors and Sub-Subcontractors have obtained and maintained policies of insurance in conformity with the requirements of Article 6.12. Failure or refusal of the Contractor to provide the District with such Certificates of Insurance may be deemed to be a default of a material obligation of the Contract Documents.

6.15 No Work at the Site Without Non-OCIP Insurance. Under no circumstances shall any Contractor, Subcontractor or Sub-Subcontractor (except Excluded Parties) commence Work at the Site without having all Non-OCIP Insurance issued and in effect in accordance with the provisions of Article 6.12. Contractor’s failure or refusal concerning Contractor’s obligations in this regard may be deemed by the District to be a default of a material obligation. Under no circumstances shall Contractor’s failure or refusal in this regard result in any adjustment of the Contract Price or Contract Time.

6.16 Additional Insurance. Pursuant to the provisions of Government Code §4420(b)(5), nothing contained in the Contract Documents or otherwise shall prohibit the Contractor, its Subcontractors, any Sub-Subcontractor or any other entity providing or performing Work of the Project from purchasing any additional insurance or coverage which he, she or it believes is necessary to protect such person or entity from any liability arising under the Contract Documents,
the Project or the Work. Any such additional insurance procured by such person or entity shall be at
the procuring party’s sole expense.

6.17 Waivers of Subrogation. Contractor hereby waives, and shall require all Subcontractors
and Sub-Subcontractors to waive, all rights against the District, its officers, agents, employees,
representatives and consultants, Construction Manager, Architect, IOR and OCIP Administrator, and
their respective agents, officers, employees and representatives, for recovery of damages to the
extent those damages are covered by policies of insurance obtained pursuant to Articles 6.12.2
through 6.12.4, inclusive.

6.18 Insurance Provided by Excluded Parties: The Contractor shall require all Excluded
Parties to provide and maintain insurance of the type and limits set forth below and in the
Supplemental Conditions. Such insurance shall name the parties required to secure same as insureds
and shall be in a form and through issuing companies acceptable to the District. Such insurance may
be provided in single policy or multiple policies (primary and excess), including an umbrella form.
Such insurance shall contain a defense of suits provision and shall provide the coverages set forth in
Article 6.18 under the following conditions:

(a) Notwithstanding any inconsistent statement in the policies obtained by Contractor
and/or Excluded Parties, or any endorsement or certificate attached thereto, it is
agreed that the District, its officers, agents, employees and representatives,
Construction Manager, Architect, IOR and OCIP Administrator, and their respective
officers, agents, employees and representatives, are additional insureds (for all
coverages except Workers’ Compensation/Employer’s Liability), and that coverage
is provided for all operations, uses, occupation, acts and activities of such insureds
under the Contract Documents, as may be amended or adjusted, regardless of
whether liability is attributable to the insured or a combination of the insured and one
or more additional insureds. The Contractor shall name, and shall require the
Excluded Parties to name, the District, its officers, agents, employees and
representatives, the Construction Manager, Architect, IOR and OCIP Administrator,
and their respective officers, agents, employees and representatives, as additional
insureds under the policies required pursuant to Articles 6.18.2 through 6.18.4,
inclusive. As to the insurance required by Article 6.18.2, such additional insured
status shall be provided and maintained using ISO additional insured endorsement
CG 20 10 (11/85 edition), or a substitute providing equivalent coverage. The
additional insured status required herein as to Article 6.18.2 shall be maintained on
behalf of all specified parties for a period of ten (10) years after Final Acceptance of
the Work. Upon the District’s request, the Contractor and/or Excluded Party shall
provide copies of all additional insured endorsements procured pursuant to this
Article 6.18.

(b) The coverage provided by the policies obtained by Contractor and/or Excluded
Parties is primary coverage and non-contributing with insurance, if any, carried by
the District, its officers, agents, employees and representatives, the Construction
Manager, Architect, IOR or OCIP Administrator, and their respective officers,
agents, employees and representatives. All such additional insured endorsements
issued thereon shall be so endorsed.
In the event one of the insureds incurs liability to any other of the insureds, these policies shall provide protection for each insured against whom claim is or may be made, including claims by other insureds in the same manner as if separate policies had been issued to each insured.

Notice of occurrences or claims under the policies shall be made to the District's Representative.

6.18.1 Workers' Compensation/Employer's Liability Insurance. The Contractor shall require all Excluded Parties to provide Workers’ Compensation/Employer’s Liability insurance in the statutory limits of the workers’ compensation laws of the State of California, including Coverage B – Employer’s Liability, in an amount not less than that specified in the Supplemental Conditions, covering operations of the party in connection with the work both at and away from the Project Site.

6.18.2 Commercial General Liability Insurance. The Contractor shall require all Excluded Parties to provide Commercial General Liability Insurance in a form providing coverage not less than that of a Standard Commercial General Liability insurance policy (occurrence form) for all operations of the party required to furnish same, including hazards of operations (including explosion, collapse and underground coverage), elevators, independent contractors, employees as additional insureds, products and completed operations (for five (5) years after Final Acceptance of the Work), with contractual liability coverage (for contracts related to the Work), personal injury liability and excess Employer’s Liability, for personal injury, bodily injury and property damage arising out of the Work in policies of insurance with limits in an amount not less than that specified in the Supplemental Conditions.

6.18.3 Automobile Liability Insurance. The Contractor shall require all Excluded Parties to provide Automobile Liability Insurance covering all owned, non-owned and hired automobiles, trucks and trailers of the Excluded Parties. Such insurance shall provide coverage not less than that of the Standard Comprehensive Automobile Liability policy with limits in an amount not less than that specified in the Supplemental Conditions for occurrences both at and away from the Project Site.

6.18.4 Aircraft Liability Insurance. If aircraft are used by an Excluded Party or anyone else on their behalf, such Excluded Party or other entity shall maintain or cause the operator of the aircraft to maintain aircraft public liability insurance insuring passengers and the general public against personal injury, bodily injury or property damage arising from aircraft owned, used, operated or hired in connection with the work of the Excluded Party or anyone else, with limits in an amount not less than that specified in the Supplemental Conditions.

6.19 Evidence of Excluded Parties’ Insurance. Contractor shall require that every Excluded Party obtain and maintain the policies of insurance set forth in Articles 6.18.1 through 6.18.4 herein. The limits of liability of such policies shall be as set forth in the Supplemental Conditions. Each of the policies of insurance obtained and maintained by an Excluded Party hereunder shall conform to the requirements of Article 6.18. Upon request of the District, Contractor shall promptly deliver Certificates of Insurance evidencing that the Excluded Parties have obtained and maintained policies of insurance in conformity with the requirements of Article 6.18. Failure or refusal of the Contractor
to provide the District with such Certificates of Insurance may be deemed to be a material default of Contractor under the Contract Documents.

6.20 No Work at the Site Without Excluded Parties’ Insurance. Under no circumstances shall any Excluded Party commence Work at the Site without having all insurance issued and in effect in accordance with the provisions of Article 6.18. Contractor’s failure or refusal concerning Contractor’s obligations in this regard may be deemed by the District to be a default of a material obligation. Under no circumstances shall Contractor’s failure or refusal in this regard result in any adjustment of the Contract Price or Contract Time.

6.21 Pollution Legal Liability Insurance. Contractor (if performing or providing any hazardous waste services, abatement or otherwise, of any type or description for the Project) shall provide and maintain, and shall require any other person or entity performing such services to provide and maintain (hereinafter collectively referred to as “Hazardous Waste Contractor”), insurance covering losses caused by pollution conditions that arise from the operations, including the completed operations, of such Hazardous Waste Contractor. Such insurance shall apply to bodily injury and property damage, including loss of use of damaged property or of property that has not been physically injured, cleanup costs and defense, including costs and expenses incurred in the investigation, defense or settlement of claims. The policies of insurance affording these coverages shall be written with limits in an amount not less than that set forth in the Supplemental Conditions. Coverage shall apply to sudden and non-sudden pollution conditions resulting from the escape or release of smoke, vapors, fumes, acids, alkalis, toxic chemicals, liquids or gases, waste materials or other irritants, contaminants or pollutants. The policies of insurance issued hereunder shall be written by an insurer acceptable to the District and shall be endorsed to include as insureds the District, its officers, agents, employees and representatives, Construction Manager, Architect, IOR and OCIP Administrator, and their respective officers, agents, employees and representatives. If coverage is written on a claims-made basis, the Hazardous Waste Contractor shall warrant that any retroactive date applicable to coverage under the policy precedes the effective date of this Contract and that continuous coverage will be maintained, or an extended discovery period will be exercised, for a period of ten (10) years from Final Acceptance of the Work. If coverage is written on an occurrence basis, the District, its officers, agents, employees and representatives, Construction Manager, Architect, IOR and OCIP Administrator, and their respective officers, agents, employees and representatives, shall be named as insureds on the Hazardous Waste Contractor's pollution legal liability policies for operations, including completed operations, relating to, or arising out of, work for the Project for a period of ten (10) years after Final Acceptance of the Work. At least five (5) working days prior to any Hazardous Waste Contractor’s commencing Work on the Site, Contractor shall provide the District with Certificates of Insurance evidencing the coverage required hereunder.

6.22 Contractor Obligations. Contractor agrees to comply with any and all terms and conditions of the policies of insurance provided by District and to comply with any and all claims handling procedures, loss prevention programs and other programs required by or related to the District’s OCIP as set forth herein. Contractor shall require Subcontractors, Sub-Subcontractors and all others covered by the District’s OCIP insurance policies to so comply. Contractor, its Subcontractors and Sub-Subcontractors shall furnish to the District, its OCIP Administrator, its designee or the insurers under the OCIP policies all information and documentation that such entity may require from time to time in connection with the issuance of policies under this Contract or the administration of the

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OCIP in such form and substance as such entity may prescribe and promptly comply with the recommendations of the OCIP insurers. Contractor shall not violate, or knowingly permit to be violated, any conditions of the policies of insurance provided by the District hereunder and shall at all times satisfy the requirements of the insurers issuing them. Contractor shall assure that all OCIP requirements imposed upon and to be performed by the Contractor shall likewise be imposed upon, assumed and performed by each Subcontractor and Sub-Subcontractor. If the Contractor, Subcontractors, Sub-Subcontractors or Excluded Parties should fail to comply with the requirements of this Article 6, the District may withhold payment due to the Contractor or suspend the work at the Contractor's sole expense and without adjustment of the Contract Price or Contract Time until such time as the Contractor, its Subcontractors, Sub-Subcontractors and/or Excluded Parties have performed such obligations to the reasonable satisfaction of the District.

6.23 Indemnity. Unless arising solely out of the active negligence, gross negligence or willful misconduct of the District, the Architect or the Construction Manager, the Contractor shall indemnify, defend and hold harmless: (i) the District and its Board of Trustees, officers, employees, agents and representatives (including the District’s Inspector); (ii) the Architect and its consultants for the Work and their respective agents and employees; and (iii) the Construction Manager and its agents and employees from and against any and all damages, losses, claims, demands or liabilities whether for damages, losses or other relief, including, without limitation attorneys fees and costs which arise, in whole or in part, from the Work, the Contract Documents or the acts, omissions or other conduct of the Contractor or any Subcontractor or any person or entity engaged by them for the Work. The Contractor’s obligations under the foregoing include without limitation: (i) injuries to or death of persons; (ii) damage to property; or (iii) theft or loss of property; and (iv) other losses, liabilities, damages or costs resulting from, in whole or part, any acts, omissions or other conduct of Contractor, any of Contractor's Subcontractors, of any tier, or any other person or entity employed directly or indirectly by Contractor in connection with the Work and their respective agents, officers or employees. If any action or proceeding, whether judicial, administrative, arbitration or otherwise, shall be commenced on account of any claim, demand or liability subject to Contractor's obligations hereunder, and such action or proceeding names the District as a party thereto, the Contractor shall, at its sole cost and expense, defend the District in such action or proceeding with counsel reasonably satisfactory to District. In the event that there shall be any judgment, award, ruling, settlement, or other relief arising out of any such action or proceeding to which the District is bound by, Contractor shall pay, satisfy or otherwise discharge any such judgment, award, ruling, settlement or relief; Contractor shall indemnify and hold harmless the District from any and all liability or responsibility arising out of any such judgment, award, ruling, settlement or relief. The Contractor's obligations hereunder are binding upon Contractor's Performance Bond Surety and these obligations shall survive notwithstanding Contractor's completion of the Work or the termination of the Contract.

6.24 Payment Bond; Performance Bond. Prior to commencement of the Work, the Contractor shall furnish a Performance Bond as security for Contractor's faithful performance of the Contract and a Labor and Material Payment Bond as security for payment of persons or entities performing work, labor or furnishing materials in connection with Contractor's performance of the Work under the Contract Documents. The amounts of the Performance Bond and the Payment Bond required hereunder shall be one hundred percent (100%) of the Contract Price. Said Labor and Material Payment Bond and Performance Bond shall be in the form and content set forth in the Contract Documents. The failure or refusal of the Contractor to furnish either the Performance Bond or the
Labor and Material Payment Bond in strict conformity with this Article 6.24 may be deemed by the
District as a default by the Contractor of a material obligation hereunder. Upon request of the
Contractor, the District may consider and accept, but is not obligated to do so, multiple sureties on
such bonds. The Surety on any bond required under the Contract Documents shall be an Admitted
Surety Insurer as that term is defined in California Code of Civil Procedure §995.120.

ARTICLE 7: CONTRACT TIME

7.1 Substantial Completion of the Work Within Contract Time. Unless otherwise expressly
provided in the Contract Documents, the Contract Time is the period of time, including authorized
adjustments thereto, allotted in the Contract Documents for achieving Substantial Completion of the
Work. The date for commencement of the Work is the date established by the Notice to Proceed
issued by the District, which shall not be postponed by the failure to act of the Contractor or of
persons or entities for whom the Contractor is responsible. The date of Substantial Completion is
the date certified by the Architect, the Construction Manager and the District’s Inspector as such in
accordance with the Contract Documents. The Contract Time is as indicated in the Special
Conditions.

7.2 Progress and Completion of the Work.

7.2.1 Time of Essence. Time limits stated in the Contract Documents are of the essence.
By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable
period for performing and achieving Substantial Completion of the Work. The Contractor
shall employ and supply a sufficient force of workers, material and equipment, and prosecute
the Work with diligence so as to maintain progress, to prevent Work stoppage and to achieve
Substantial Completion of the Work within the Contract Time.

7.2.2 Substantial Completion. Substantial Completion is that stage in the progress of the
Work when the Work is complete in accordance with the Contract Documents, including but
not limited to start-up and testing, so the District can occupy or use the Work for its intended
purpose. Substantial Completion shall be determined by the Architect and the District's
Inspector upon request by the Contractor in accordance with the Contract Documents. The
good faith and reasonable determination of Substantial Completion by the District's
Inspector and the Architect shall be controlling and final.

7.2.3 Correction or Completion of the Work After Substantial Completion. Upon
achieving Substantial Completion of the Work, the District, the District's Inspector, the
Construction Manager, the Architect and the Contractor shall jointly inspect the Work and
prepare a comprehensive list of items of the Work (punch list) to be corrected or completed
by the Contractor. The exclusion of, or failure to include, any item on such list shall not
alter or limit the obligation of the Contractor to complete or correct any portion of the Work
in accordance with the Contract Documents. In the event that the Contractor shall fail or
refuse, for any reason, to complete all punch list items within the Contract Time, Contractor
shall be subject to assessment of Liquidated Damages in accordance with Article 7.4 hereof.
If the Contractor fails or refuses to complete all items of the Work within the Contract Time,
the District may, in its sole and exclusive discretion and without further notice to Contractor,
elect to cause the completion of such items of the Work, provided, however, that such
election by the District is in addition to, and not in lieu of, any other right or remedy of the District under the Contract Documents or at law. If the District elects to complete items of the Work, Contractor shall be responsible for all costs incurred by the District in connection therewith and the District may deduct such costs from the Contract Price then or thereafter due the Contractor; if these costs exceed the remaining Contract Price due to the Contractor, the Contractor and the Performance Bond Surety are liable to District for any such excess costs.

7.2.4 Final Completion. Final Completion is that stage of the Work when all Work has been completed in accordance with the Contract Documents, including without limitation, the performance of all punch list items noted upon Substantial Completion, and the Contract has been otherwise fully performed by the Contractor. Final Completion shall be determined by the Architect and the District's Inspector upon request of the Contractor. The good faith and reasonable determination of Final Completion by the District's Inspector and the Architect shall be controlling and final.

7.2.5 Contractor Responsibility for Multiple Inspections. In the event the Contractor shall request determination of Substantial or Final Completion and it is determined by the District that the Work does not then justify certification of Substantial or Final Completion, as applicable, and re-inspection is required at a subsequent time to make such determination, the Contractor shall be responsible for all costs of such re-inspection, including without limitation, the fees of the Architect and the salary of the District's Inspector. The District may deduct such costs from the Contract Price then due or thereafter due to the Contractor.

7.2.6 Final Acceptance. Final Acceptance of the Work shall occur upon approval of the Work by the District's Board of Trustees. Such approval shall be submitted for adoption at the next regularly scheduled meeting of the District's Board of Trustees after the determination of Final Completion. The commencement of any warranty or guarantee period under the Contract Documents shall be deemed to be the date upon the District's Board of Trustees approves of the Final Acceptance of the Work.

7.3 Progress Schedule; Contractor Responsibility for Construction Schedule. The Contractor shall be responsible for the preparation, submittal and maintenance of the Construction Schedules required by the Contract Documents (including but not limited to Section 01360 of the Contract Specifications), and any failure of the Contractor to do so may be deemed by the District as the Contractor's default in the performance of a material obligation under Contract Documents. Any and all costs or expenses required or incurred to prepare, submit, maintain, and update the Construction Schedules shall be solely that of the Contractor and no such cost or expense shall be charged to the District. The Contract Price shall not be subject to adjustment on account of costs, fees or expenses incurred or associated with the Contractor's preparation, submittal, maintenance or updating of the Construction Schedules. All schedule submittals shall include electronic diskettes for use by the District in its analysis and approval of the schedule submittal. The District may, from time to time, and in the District's sole and exclusive discretion, transmit to the Contractor's Performance Bond Surety the Approved Construction Schedule, any updates thereof and the narrative statement described hereinabove. The District's election to transmit, or not to transmit such information, to the Contractor's Performance Bond Surety shall not limit the Contractor's obligations under the Contract Documents. Review of any Construction Schedules required under the Contract...
Documents and any comments thereto by the District, the Construction Manager and/or the Architect shall not be deemed to be the assumption of construction means, methods or sequences by the District, the Construction Manager or the Architect, all of which remain the Contractor’s obligations under the Contract Documents.

7.4 Adjustment of Contract Time. If Substantial Completion or completion of an Interim Milestone is delayed, adjustment, if any, to the Contract Time on account of such delay shall be in accordance with this Article 7.4.

7.4.1 Excusable Delays. If Substantial Completion of the Work or completion of an Interim Milestone is delayed by Excusable Delays, the Contract Time shall be subject to adjustment for such reasonable period of time as determined by the District. Excusable Delays shall not result in any increase in the Contract Price. Excusable Delays refer to unforeseeable and unavoidable casualties or other unforeseen causes beyond the control, and without fault or neglect, of the Contractor, any Subcontractor, Material Supplier or other person directly or indirectly engaged by the Contractor in performance of any portion of the Work. Excusable Delays include unanticipated and unavoidable labor disputes, unusual and unanticipated delays in transportation of equipment, materials or Construction Equipment reasonably necessary for completion and proper execution of the Work, and unanticipated unusually severe weather conditions. Neither the financial resources of the Contractor or any person or entity directly or indirectly engaged by the Contractor in performance of any portion of the Work shall be deemed conditions beyond the control of the Contractor. If an event of Excusable Delay occurs, the Contract Time shall be subject to adjustment hereunder only if the Contractor establishes: (i) full compliance with all applicable provisions of the Contract Documents relative to the method, manner and time for Contractor’s notice and request for adjustment of the Contract Time; (ii) that the event(s) forming the basis for Contractor’s request to adjust the Contract Time are outside the reasonable control and without any fault or neglect of the Contractor or any person or entity directly or indirectly engaged by Contractor in performance of any portion of the Work; and (iii) that the event(s) forming the basis for Contractor’s request to adjust the Contract Time directly and adversely impacted the progress of the Work as indicated in the Approved Construction Schedule or the most recent updated Approved Construction Schedule relative to the date(s) of the claimed event(s) of Excusable Delay. The foregoing provisions notwithstanding, if the Special Conditions set forth a number of “Rain Days” to be anticipated during performance of the Work, the Contract Time shall not be adjusted for rain related unusually severe weather conditions until and unless the actual number of Rain Days during performance of the Work shall exceed those noted in the Special Conditions and such additional Rain Days shall have directly and adversely impacted the progress of the Work as depicted in the Approved Construction Schedule or the most recent updated Approved Construction Schedule relative to the date(s) of such additional Rain Days.

7.4.2 Compensable Delays. If Substantial Completion of the Work or completion of an Interim Milestone is delayed and such delay is caused by the acts or omissions of the District, the Architect, the Construction Manager or separate contractor employed by the District (collectively “Compensable Delays”), upon Contractor’s request and notice, in strict conformity with Articles 7 and 9 of these General Conditions, the Contract Time will be
adjusted by Change Order for such reasonable period of time as determined by the Architect, Construction Manager and the District. In accordance with California Public Contract Code § 7102, if the Contractor’s progress is delayed by any of the events described in the preceding sentence, Contractor shall not be precluded from the recovery of damages directly and proximately resulting therefrom, provided that the District is liable for the delay, the delay is unreasonable under the circumstances involved and the delay was not within the reasonable contemplation of the District and the Contractor at the time of execution of the Agreement. In such event, Contractor’s damages, if any, shall be limited to direct, actual and unavoidable additional costs of labor, materials or Construction Equipment directly resulting from such delay, and shall exclude indirect or other consequential damages. Except as expressly provided for herein, Contractor shall not have any other claim, demand or right to adjustment of the Contract Price arising out of delay, interruption, hindrance or disruption to the progress of the Work. Adjustments to the Contract Price and the Contract Time, if any, on account of Changes to the Work or Suspension of the Work shall be governed by the applicable provisions of the Contract Documents, including without limitation, Articles 9 and 14 of these General Conditions.

7.4.3 Unexcusable Delays. Unexcusable Delays refer to any delay to the progress of the Work caused by events or factors other than those specifically identified in Articles 7.4.1 and 7.4.2 above. Neither the Contract Price nor the Contract Time shall be adjusted on account of Unexcusable Delays.

7.4.4 Adjustment of Contract Time.

7.4.4.1 Procedure for Adjustment of Contract Time. The Contract Time shall be subject to adjustment only in strict conformity with applicable provisions of the Contract Documents. Failure of Contractor to request adjustment(s) of the Contract Time in strict conformity with applicable provisions of the Contract Documents shall be deemed Contractor’s waiver of the same.

7.4.4.2 Limitations Upon Adjustment of Contract Time on Account of Delays. Any adjustment of the Contract Time on account of an Excusable Delay or a Compensable Delay shall be limited as set forth herein. If an Excusable Delay and a Compensable Delay occur concurrently, the maximum extension of the Contract Time shall be the number of days from the commencement of the first delay to the cessation of the delay which ends last. If an Unexcusable Delay occurs concurrently with either an Excusable Delay or a Compensable Delay, the maximum extension of the Contract Time shall be the number of days, if any, which the Excusable Delay or the Compensable Delay exceeds the period of time of the Unexcusable Delay. No adjustment of the Contract Time shall be made on account of any Excusable Delays or Compensable Delays unless such delay(s) actually and directly impact Work or Work activities on the critical path of the then current and updated Approved Construction Schedule as of the date on which such delay first occurs. The District shall not be deemed in breach of, or otherwise in default of any obligation hereunder, if the District shall deny any request by the Contractor for an adjustment of the Contract Time for any delay which does not actually and directly impact Work on the then current and updated Approved Construction Schedule.
7.5 Liquidated Damages. Should the Contractor neglect, fail or refuse to achieve Substantial Completion of the Work within the Contract Time, as adjusted, or to complete an Interim Milestone or Final Completion in accordance with the times specified or provided for in the Contract Documents, the Contractor agrees to pay to the District the amount of per diem Liquidated Damages set forth in the Special Conditions, not as a penalty but as Liquidated Damages, for every day beyond the Contract Time, as adjusted, Interim Milestone or Final Completion, the Work is achieved. The Liquidated Damages amounts set forth in the Special Conditions are agreed upon by and between the Contractor and the District because of the difficulty of fixing the District's actual damages in the event of delayed completion of the Work. The Contractor and the District specifically agree that said amounts are reasonable estimates of the District's damages in such event, and that such amounts do not constitute a penalty. Liquidated Damages may be deducted from the Contract Price then or thereafter due the Contractor. The Contractor and the Surety shall be liable to the District for any Liquidated Damages exceeding any amount of the Contract Price then held or retained by the District. In the event that the Contractor shall fail or refuse to correct or complete items of the Work noted upon Substantial Completion and the District elects to exercise its right to cause completion or correction of such items pursuant to Article 7.2.3.2 hereof, the District's assessment of Liquidated Damages pursuant to the foregoing shall be in addition, and not in lieu of, the District's right to charge Contractor with the cost of completing or correcting such items of the Work, as provided for under Article 7.2.3.2. The Contractor and the District acknowledge and agree that the provisions of this Article 7.5 are reasonable under the circumstances existing at the time of the Contractor's execution of the Agreement.

ARTICLE 8: CONTRACT PRICE

8.1 Contract Price. The Contract Price is the amount stated in the Agreement as such, and subject to any authorized adjustments thereto in accordance with the Contract Documents, is the total amount payable by the District to the Contractor for performance of the Work under the Contract Documents. The District's payment of the Contract Price to the Contractor shall be in accordance with the Contract Documents.

8.2 Cost Breakdown (Schedule of Values). Contractor shall furnish a detailed tabular Cost Breakdown (Schedule of Values) of the Contract Price consistent with the cost-loaded work activities included in the Approved Construction Schedule in accordance with Section 01050 of the Contract Specifications.

8.3 Progress Payments.

8.3.1 Applications for Progress Payments. During the Contractor's performance of the Work, the Contractor shall submit monthly, on the first working day of each month, to the Construction Manager, Applications for Progress Payments, on forms approved by the District, setting forth an itemized estimate of Work completed in the preceding month. Values utilized in the Applications for Progress Payments shall be based upon the proper updating of the Approved Construction Schedule. The Cost Breakdown and/or Approved Cost Loaded Construction Schedule, pursuant to Article 8.2 above, and such values shall be only for determining the basis of Progress payments to the Contractor, and shall not be considered as fixing a basis for adjustments, whether additive or deductive, to the Contract Price.
8.3.2 District's Review of Applications for Progress Payments. In accordance with Public Contract Code §20104.50, upon receipt of an Application for Progress Payment, the Construction Manager, the District’s Inspector, and the Architect shall review the Application. Such review shall be for the purpose of determining that the Application for Progress Payment is a proper Progress Payment request. For purposes of this Article 8.3.2, an Application for Progress Payment shall be deemed "proper" only if it is submitted on the properly completed form approved by the District, and accompanied by:

(i) the Application submitted by the Contractor shall be consistent with and accompanied by the updated Approved Construction Schedule;

(ii) complete and accurate weekly Certified Payrolls of the Contractor and all Subcontractors, of any tier, for laborers performing any portion of the Work for which a Progress Payment is included (if requested);

(iii) duly completed and executed forms of Conditional Waiver and Release of Rights Upon Progress Payment in accordance with California Civil Code § 3262 of the Contractor, all Subcontractors of any tier, and Material Suppliers covering the Progress Payment requested;

(iv) duly completed and executed forms of Unconditional Waiver and Release of Rights upon Progress Payment in accordance with California Civil Code § 3262 of the Contractor, all Subcontractors of any tier, and Material Suppliers covering the Progress Payment received by the Contractor under the prior Application for Progress Payment;

(v) a current union statement reflecting that the Contractor and any Subcontractor of any tier, are current in the payment of any supplemental fringe benefits required pursuant to any collective bargaining agreement to which the Contractor or any such Subcontractor is a party to or is otherwise bound by (if requested); and

(vi) a certification by the Contractor that it has maintained the Record Documents reflecting the actual as-built conditions of the Work performed (such certification is subject to verification by the District's Inspector prior to approval of the Progress Payment).

In accordance with Public Contract Code §20104.50, an Application for Progress Payment determined by the District not to be a proper Application for Progress Payment shall be returned by the District to the Contractor as soon as is practicable after receipt of the same from the Contractor, but in no event not more than seven (7) days after the District's receipt thereof. The District's return of any Application for Progress Payment pursuant to the preceding sentence shall be accompanied by a written document setting forth the reason(s) why the Application for Progress Payment is not proper.

8.3.3 Architect and District's Inspector Review of Applications for Progress Payments. Upon receipt of an Application for Progress Payment, the Architect and the District's Inspector shall meet with the Contractor to inspect the completed work and verify the portion of the work completed during the month using the approved Construction Records.
Schedule update and the Cost Breakdown. The Application for Progress Payment shall reflect the agreed percentages of work complete that is properly due to the Contractor under the terms of the Contract Documents. The Application submitted by the Contractor shall be consistent with and accompanied by the updated Approved Construction Schedule.

8.3.4 District’s Disbursement of Progress Payments.

8.3.4.1 Timely Disbursement of Progress Payments. In accordance with Public Contract Code §20104.50, within thirty (30) days after the District's receipt of a proper Application for Progress Payment, there shall be paid, by District, to Contractor a sum equal to ninety five percent (95%) of the value of the Work indicated in the Application for Progress Payment as verified and approved by the District’s Inspector and the Architect. If an Application for Progress payment is determined not to be proper due to the failure or refusal of the contractor to submit the required documents with the Application for progress payment, or if it is reasonably determined that the Record Documents have not been continuously maintained to reflect the actual as-built conditions of the Work completed in the period for which the Progress Payment is requested, the thirty (30) day period hereunder for the District’s timely disbursement of a Progress payment shall be deemed to commence on the date that the District is actually in receipt of a complete and proper Application for Progress payment or verifies the proper updating of the as-built conditions.

8.3.4.2 Untimely Disbursement of Progress Payments. In accordance with Public Contract Code §20104.50, in the event that the District shall fail to make any Progress Payment within thirty (30) days after receipt of an undisputed and properly submitted Application for Progress Payment, the District shall pay the Contractor interest on the undisputed amount of such Application for Progress Payment equal to the legal rate of interest set forth in California Code of Civil Procedure § 685.010(a).

8.3.4.3 District’s Right to Disburse Progress or Final Payments by Joint Checks. The District may, in its sole discretion, issue joint checks to the Contractor and any Subcontractor or Material Supplier providing work, labor, materials, equipment or services for the Project in satisfaction of its obligation to make Progress Payments or the Final Payment due hereunder. District may require Contractor to provide copies of applicable Subcontracts, purchase orders, rental invoices or materials invoices.

8.3.4.4 No Waiver of Defective or Non-Conforming Work. The approval of any Application for Progress Payment or the disbursement of any Progress Payment to the Contractor shall not be deemed nor constitute acceptance of defective Work or Work not in conformity with the Contract Documents.

8.3.5 Progress Payments for Changed Work. The Contractor’s Applications for Progress Payment may include requests for payment on account of Changes in the Work which have been properly authorized and approved by the District’s Inspector, the Architect and the Board. Except as provided for herein, no other payment shall be made by the District for Changes in the Work.

8.3.6 Materials or Equipment Not Incorporated Into the Work.
8.3.6.1 Limitations Upon Payment. Except as expressly provided for herein, no payments shall be made by the District on account of any item of the Work, including without limitation, materials or equipment which has/have not been incorporated into and made a part of the Work.

8.3.6.2 Materials or Equipment Delivered and Stored at the Site. The District may, in its sole and exclusive discretion, make payment for materials or equipment not yet incorporated into the Work if, a request for payment of such materials or equipment is made and if all of the following are complied with: (a) the materials or equipment have been delivered to the Site; (b) adequate arrangements, reasonably satisfactory to the District, have been made by the Contractor to store and protect such materials or equipment at the Site including without limitation, insurance reasonably satisfactory to the District, covering and protecting against the risk of loss, destruction, theft or other damage to such materials or equipment while in storage; and (c) the establishment of procedures reasonably satisfactory to the District by which title to such materials or equipment will be vested in the District upon the District's payment therefor. The Contractor acknowledges that the discretion to make, or not to make, payment for materials or equipment delivered or stored at the Site of the Work pursuant to the preceding sentence shall be exercised exclusively by the District; the District's exercise of discretion not to make payment for materials or equipment delivered or stored at the Site, but not yet incorporated into the Work shall not be deemed the District's default hereunder. In the event that the District shall elect to make payment for materials or equipment delivered and stored at the Site, the costs and expenses incurred to comply with the requirements of (b) and (c) of this Article 8.3.6.2 shall be borne solely and exclusively by the Contractor and no payment shall be made by the District on account of such costs and expenses.

8.3.7 Exclusions From Progress Payments. No payments shall be made by the District for materials or equipment to be incorporated into the Work where such materials or equipment have not been delivered or stored at the Site. The District shall not make any payment on account of any materials or equipment which are in the process of being fabricated or which are in transit to the Site or other storage location. In addition to the District's right to withhold disbursement of any Progress Payment provided for in the Contract Documents, neither the Contractor's Application for Progress Payment shall include, nor shall the District be obligated to disburse any portion of the Contract Price for amounts which the Contractor does not intend to pay any Subcontractor, of any tier, or Material Supplier because of a dispute or any other reason.

8.3.8 Title to Work. The Contractor warrants that title to all Work covered by an Application for Progress Payment will pass to the District no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Progress Payment, all Work for which a Progress Payment has been previously issued and the Contractor has received payment from the District therefor shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, stop notices, security interests or encumbrances in favor of the Contractor, Subcontractors, Material Suppliers or other persons or entities making a claim by reason of having provided labor, materials and equipment
8.4 Final Payment.

8.4.1 Application for Final Payment. When the Contractor has achieved Final Completion of the Work and has otherwise fully performed its obligations under the Contract Documents, the Contractor shall submit an Application for Final Payment on such form as approved by the District. Thereupon, the Architect and the District's Inspector will promptly make a final inspection of the Work and when the Architect and the District's Inspector find the Work acceptable under the Contract Documents and that the Contract has been fully performed by the Contractor, the Architect and the District's Inspector will thereupon promptly approve the Application for Final Payment, stating that to the best their knowledge, information and belief, the Work has been completed in accordance with the terms of the Contract Documents. The Final Payment shall include the remaining balance of the Contract Price and any retention from Progress Payments previously withheld by the District.

8.4.2 Conditions Precedent to Disbursement of Final Payment. Neither Final Payment nor any remaining Contract Price shall become due until the Contractor submits to the District each and all of the following, the submittal of which are conditions precedent to the District's obligation to disburse the Final Payment: (i) an affidavit or certification by the Contractor that payrolls, bills for materials and other indebtedness incurred in connection with the Work for which the District or the District's property may or might be responsible or encumbered have been paid or otherwise satisfied; (ii) a certificate evidencing that insurance required by the Contract Documents to remain in force after the Contractor's receipt of Final Payment is currently in effect; (iii) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover any period following Final Payment as required by the Contract Documents; if required (iv) consent of the Surety on the Labor and Material Payment Bond and Performance Bond, to Final Payments if required; (v) duly completed and executed forms of Conditional or Unconditional Waivers and Releases of rights upon final Payment of the Contractor, Subcontractors of any tier and Material Suppliers in accordance with California Civil Code §3262, with each of the same stating that there are, or will be, no claims for additional compensation after disbursement of the Final Payment; (vi) Operations and Maintenance manuals and separate warranties provided by any manufacturer or distributor of any materials or equipment incorporated into the Work; (vii) the Record Drawings; (viii) the form of Guarantee included in the Contract Documents duly executed by an authorized representative of the Contractor; (ix) any and all other items or documents required by the Contract Documents to be delivered to the District upon completion of the Work; and (x) if required by the District, such other data establishing payment or satisfaction of obligations such as receipts, releases and waivers of liens, stop notices, claims, security interest or encumbrances arising out of the Contract to the extent and in such form as may be required by the District.

8.4.3 Disbursement of Final Payment. Provided that the District is then in receipt of all documents and other items in Article 8.4.2 above as conditions precedent to the District’s obligation to disburse Final Payment, not later than sixty (60) days following Final Acceptance the District shall disburse the Final Payment to the Contractor. Pursuant to California Public Contract Code §7107, if there is any dispute between the District and the
Contractor at the time that disbursement of the Final Payment is due, the District may withhold from disbursement of the Final Payment an amount not to exceed one hundred fifty percent (150%) of the amount in dispute.

8.4.4 Waiver of Claims. The Contractor's acceptance of the Final Payment is a waiver and release by the Contractor of any and all claims against the District for compensation or otherwise in connection with the Contractor's performance of the Contract.

8.4.5 Claims Asserted After Final Payment. Any lien, stop notice or other claim filed or asserted after the Contractor's acceptance of the Final Payment by any Subcontractor, of any tier, laborer, Material Supplier or others in connection with or for Work performed under the Contract Documents shall be the sole and exclusive responsibility of the Contractor who further agrees to indemnify, defend and hold harmless the District and its officers, agents, representatives and employees from and against any claims, demands or judgments arising or associated therewith, including without limitation attorneys fees incurred by the District in connection therewith. In the event any lien, stop notice or other claim of any Subcontractor, Laborer, Material Supplier or others performing Work under the Contract Documents remain unsatisfied after Final Payment is made, Contractor shall refund to District all monies that the District may pay or be compelled to pay in discharging any lien, stop notice or other claim, including, without limitation all costs and reasonable attorneys fees incurred by District in connection therewith.

8.5 Withholding of Payments. The District may withhold any Progress Payment or the Final Payment, in whole or in part, or backcharge the Contractor to the extent it may deem advisable to protect the District on account of: (i) defective Work or Work not in conformity with the requirements of the Contract Documents which is not remedied; (ii) failure of the Contractor to make payments when due Subcontractors or Material Suppliers for materials or labor; (iii) claims filed or reasonable evidence of the probable filing of claims by Subcontractors, laborers, Material Suppliers, or others performing any portion of the Work under the Contract Documents for which the District may be liable or responsible including, without limitation, Stop Notice Claims filed with the District pursuant to California Civil Code §3179 et seq.; (iv) a reasonable doubt that the Contract can be completed for the then unpaid balance of the Contract Price; (v) tax demands filed in accordance with California Government Code §12419.4; (vi) inadequate or delinquent payroll records, or violations of requirements to pay prevailing wages, or employment of apprentices; (vii) other claims, penalties and/or forfeitures for which the District is required or authorized to retain funds otherwise due the Contractor; (viii) any amounts due from the Contractor to the District under the terms of the Contract Documents; (ix) the Contractor’s failure to perform any of its obligations under the Contract Documents (including the District’s Labor Compliance Program) or its default under the Contract Documents or its failure to maintain adequate progress of the Work; or (x) the Contractor’s failure to timely provide Certified Payrolls of the Contractor and all Subcontractors, of any tier, in accordance with Articles 8.3.2., 8.4.2. or applicable law. In addition to the foregoing, the District shall not be obligated to process any Application for Progress Payment or Final Payment, nor shall Contractor be entitled to any Progress Payment or Final Payment so long as any lawful or proper direction concerning the Work or the performance thereof or any portion thereof, given by the District, the District’s Inspector, the Architect or any public authority having jurisdiction over the Work, or any portion thereof, shall not be fully and completely complied with by the Contractor.
When the District is reasonably satisfied that the Contractor has remedied any such deficiency, payment shall be made of the amount withheld.

8.6 **Payments to Subcontractors.** The Contractor shall pay all Subcontractors for and on account of Work of the Contract performed by such Subcontractors in accordance with the terms of their respective subcontracts and as provided for pursuant to California Public Contract Code §10262, the provisions of which are deemed incorporated herein by this reference. In the event of the Contractor's failure to make payment to Subcontractors in conformity with California Public Contract Code §10262, the provisions of California Public Contract Code §10253 shall apply; by this reference, the provisions of California Public Contract Code §10253 are incorporated herein in its entirety, except that the references in said Section 10253 to "the director" shall be deemed to refer to the District.

8.7 **Computerized Job Cost Reporting System.**

8.7.1 **Job Cost Reporting.** The Contractor shall maintain a computerized job cost reporting system conforming to the requirements set forth herein. The computer program(s) utilized by the Contractor shall be subject to the review and acceptance by the District. The job cost reporting systems for the Work shall be updated in regular intervals of not more than one (1) calendar month.

8.7.2 **Job Cost Reporting System Requirements.** The computerized job cost programs utilized by the Contractor shall conform and comply with generally accepted accounting principles applied in a consistent manner and with recognized and generally accepted construction industry accounting standards, guidelines and procedures. The job cost reporting system format and configuration shall follow the general format of the District approved Cost Breakdown and budgets established for each line item shall be traceable to a bid estimate of costs. The job cost reporting systems utilized by the Contractor and applicable Subcontractors shall be capable of: (a) providing overall cost status on a monthly and cumulative basis; (b) providing comparative analysis of the original budgeted costs, actual costs, remaining budget, and projected cost of completion; the job cost reporting system shall be capable of providing comparative analysis for individual line items and the totality of the Work reflected in the job cost report and; (c) tracking adjustments to original budget amounts for Changes to the Work (including, without limitation, issued, pending and potential Change Orders).

8.7.3 **Job Cost System Information.** Upon request of the District, the Contractor and applicable Subcontractors shall make available written job cost reports and/or provide the District with the electronic files of the then current or requested job cost report. The Contractor's obligations hereunder are material.

**ARTICLE 9: CHANGES**

9.1 **Changes in the Work.** The District, at any time, by written order, may make Changes within the general scope of the Work under the Contract Documents or issue additional instructions, require additional Work or direct deletion of Work. The Contractor shall not proceed with any Change involving an increase or decrease in the Contract Price or the Contract Time without prior
written authorization from the District. The foregoing notwithstanding, the Contractor shall promptly commence and diligently complete any Change to the Work subject to the District's written authorized issued pursuant to the preceding sentence; the Contractor shall not be relieved or excused from its prompt commencement and diligent completion of any Change subject to the District's written authorization by virtue of the absence or inability of the Contractor and the District to agree upon the extent of any adjustment to the Contract Time or the Contract Price on account of such Change. The issuance of a Change Order pursuant to this Article 9 in connection with any Change authorized by the District under this Article 9.1 shall not be deemed a condition precedent to Contractor's obligation to promptly commence and diligently complete any such Change authorized by the District hereunder. The District's right to make Changes shall not invalidate the Contract nor relieve the Contractor of any liability or other obligations under the Contract Documents. Any requirement of notice of Changes in the scope of Work to the Surety shall be the responsibility of the Contractor. Changes to the Work depicted or described in the Drawings or the Specifications shall be subject to approval by the DSA. The District may make Changes to bring the Work or the Project into compliance with environmental requirements or standards established by state or federal statutes and regulations enacted after award of the Contract.

9.2 Oral Order of Change in the Work. Any oral order, direction, instruction, interpretation, or determination from the District, the District's Inspector or the Architect which in the opinion of the Contractor causes any change to the scope of the Work, or otherwise requires an adjustment to the Contract Price or the Contract Time, shall be treated as a Change only if the Contractor gives the Architect and the District's Inspector written notice within ten (10) days of the order, directions, instructions, interpretation or determination and prior to acting in accordance therewith. Time is of the essence in Contractor's written notice pursuant to the preceding sentence so that the District can promptly investigate and consider alternative measures to address the order, direction, instruction, interpretation or determination giving rise to Contractor's notice. Accordingly, Contractor acknowledges that its failure, for any reason, to give written notice within ten (10) days of such order, direction, instruction, interpretation or determination shall be deemed Contractor's waiver of any right to assert or claim any entitlement to an adjustment of the Contract Time or the Contract Price on account of such order, direction, instruction, interpretation or determination. The written notice shall state the date, circumstances, extent of adjustment to the Contract Price or the Contract Time, if any, requested, and the source of the order, directions, instructions, interpretation or determination that the Contractor regards as a Change. Unless the Contractor acts in strict accordance with this procedure, any such order, direction, instruction, interpretation or determination shall not be treated as a Change and the Contractor hereby waives any claim for any adjustment to the Contract Price or the Contract Time on account thereof.

9.3 Contractor Submittal of Data. Within fifteen (15) days after receipt of a written order directing a Change in the Work or furnishing the written notice regarding any oral order directing a Change in the Work, the Contractor shall submit to the District a detailed written statement setting forth the amount of any adjustment to the Contract Price on account thereof, properly itemized and supported by sufficient substantiating data to permit evaluation of the same, and the extent of adjustment of the Contract Time, if any, required by such Change. No claim or adjustment to the Contract Price or the Contract Time shall be allowed if not asserted by the Contractor in strict conformity herewith or if asserted after Final Payment is made under the Contract Documents.
9.4 Adjustment to Contract Price and Contract Time on Account of Changes to the Work.

9.4.1 Adjustment to Contract Price. Adjustments to the Contract Price due to Changes in the Work shall be determined by application of one of the following methods, in the following order of priority:

9.4.1.1 Mutual Agreement. By negotiation and mutual agreement, on a lump sum basis, between the District and the Contractor on the basis of the estimate of the actual and direct increase or decrease in costs on account of the Change. Upon request of the District, the Contractor shall provide a detailed estimate of increase or decrease in costs directly associated with performance of the Change along with cost breakdowns of the components of the Change and supporting data and documentation. The Contractor shall be solely responsible for any additional costs or additional time arising out of, or related in any manner to, its failure to provide the estimate of costs within fifteen (15) days after the receipt of the written request of the District for such estimate.

9.4.1.2 Determination by the District. By the District, whether or not negotiations are initiated pursuant to Article 9.4.1.1 above, based upon actual and necessary costs incurred by the Contractor as determined by the District on the basis of the Contractor's records. In the event that the procedure set forth in this Article 9.4.1.2 is utilized to determine the extent of adjustment to the Contract Price on account of Changes to the Work, promptly upon determining the extent of adjustment to the Contract Price, the District shall notify the Contractor in writing of the same; the Contractor shall be deemed to have accepted the District's determination of the amount of adjustment to the Contract Price on account of a Change to the Work unless Contractor shall notify the District, the Architect and the District's Inspector, in writing, not more than fifteen (15) days from the date of the District's written notice, of any objection to the District's determination. Failure of the Contractor to timely notify the District, the Architect and the District's Inspector of Contractor's objections to the District's determination of the extent of adjustment to the Contract Price shall be deemed Contractor's acceptance of the District's determination and a waiver of any right or basis of the Contractor to thereafter protest or otherwise object to the District's determination. Notwithstanding any objection of the Contractor to the District's determination of the extent of any adjustment to the Contract Price pursuant to this Article 9.4.1.2, Contractor shall, pursuant to Article 9.7 below, diligently proceed to perform and complete any such Change.

9.4.1.3 Basis for Adjustment of Contract Price. If Changes in the Work require an adjustment of the Contract Price pursuant to Articles 9.4.1.1 or 9.4.1.2 above, the basis for adjustment of the Contract Price shall be as follows:

9.4.1.3.1 Labor. Contractor shall be compensated for the costs of labor actually and directly utilized in the performance of the Change. Such labor costs shall be limited to field labor for which there is a prevailing wage rate classification. Wage rates for labor shall not exceed the prevailing wage rates in the locality of the Site and shall be in the labor classification(s) necessary for the performance of the Change. Use of a labor classification which would increase labor costs associated with any Change shall not be permitted. Labor costs shall exclude costs incurred by
the Contractor in preparing estimate(s) of the costs of the Change, in the maintenance of records relating to the costs of the Change, coordination and assembly of materials and information relating to the Change or performance thereof, or the supervision and other overhead and general conditions costs associated with the Change or performance thereof.

9.4.1.3.2 Materials and Equipment. Contractor shall be compensated for the costs of materials and equipment necessarily and actually used or consumed in connection with the performance of Changes. Costs of materials and equipment may include reasonable costs of transportation from a source closest to the site of the Work and delivery to the Site. If discounts by Material Suppliers are available for materials necessarily used in the performance of Changes, they shall be credited to the District. If materials and/or equipment necessarily used in the performance of Changes are obtained from a supplier or source owned in whole or in part by the Contractor, compensation therefor shall not exceed the current wholesale price for such materials or equipment. If, in the reasonable opinion of the District, the costs asserted by the Contractor for materials and/or equipment in connection with any Change is excessive, or if the Contractor fails to provide satisfactory evidence of the actual costs of such materials and/or equipment from its supplier or vendor of the same, the costs of such materials and/or equipment and the District's obligation for payment of the same shall be limited to the then lowest wholesale price at which similar materials and/or equipment are available in the quantities required to perform the Change. The District may elect to furnish materials and/or equipment for Changes to the Work, in which event the Contractor shall not be compensated for the costs of furnishing such materials and/or equipment or any mark-up thereon.

9.4.1.3.3 Construction Equipment. Contractor shall be compensated for the actual cost of the necessary and direct use of Construction Equipment in the performance of Changes to the Work. Use of such Construction Equipment in the performance of Changes to the Work shall be compensated in increments of hourly, weekly or monthly rates, whichever shall be the most economical to the District when applied to the scope of the specific change. Rental time for Construction Equipment moved by its own power shall include time required to move such Construction Equipment to the site of the Work from the nearest available rental source of the same. If Construction Equipment is not moved to the Site by its own power, Contractor will be compensated for the loading and transportation costs in lieu of rental time. The foregoing notwithstanding, neither moving time or loading and transportation time shall be allowed if the Construction Equipment is used for performance of any portion of the Work other than Changes to the Work. Unless prior approval in writing is obtained by the Contractor from the Architect, the District's Inspector and the District, no costs or compensation shall be allowed for time while Construction Equipment is inoperative, idle or on standby, for any reason. The Contractor shall not be entitled to an allowance or any other compensation for Construction Equipment or tools used in the performance of Changes to the Work where such Construction Equipment or tools have a replacement value of $1,000.00 or less. Construction Equipment costs claimed by the Contractor in connection with
the performance of any Change to the Work shall not exceed rental rates (Blue Book) established by distributors or construction equipment rental agencies in the locality of the Site; any costs asserted which exceed such rental rates shall not be allowed or paid. Unless otherwise specifically approved in writing by the Architect, the District's Inspector and the District, the allowable rate for the use of Construction Equipment in connection with Changes to the Work shall constitute full compensation to the Contractor for the cost of rental, fuel, power, oil, lubrication, supplies, necessary attachments, repairs or maintenance of any kind, depreciation, storage, insurance, labor (exclusive of labor costs of the Construction Equipment operator), and any all other costs incurred by the Contractor incidental to the use of such Construction Equipment.

9.4.1.3.4 Mark-up on Costs of Changes to the Work. In determining the cost to the District and the extent of increase to the Contract Price resulting from a Change adding to the Work, the allowance for mark-ups on the costs of the Change for all overhead (including home office and field overhead), general conditions costs and profit associated with the Change shall not exceed the percentage set forth in the Special Conditions, regardless of the number of Subcontractors, of any tier, performing any portion of any Change to the Work. If a Change to the Work reduces the Contract Price, the maximum adjustment to the Contract Price shall be the actual cost reduction realized by the reduced or deleted Work multiplied by the percentage set forth in the Special Conditions.

9.4.1.4 Contractor Maintenance of Records. In the event that Contractor shall be directed to perform any Changes to the Work pursuant to Article 9.1 or 9.2, or should the Contractor encounter conditions which the Contractor, pursuant to Article 9.6, believes would obligate the District to adjust the Contract Price and/or the Contract Time, Contractor shall maintain detailed records on a daily basis. Such records shall include without limitation hourly records for labor and Construction Equipment and itemized records of materials and equipment used that day in connection with the performance of any Change to the Work. In the event that more than one Change to the Work is performed by the Contractor in a calendar day, Contractor shall maintain separate records of labor, Construction Equipment, materials and equipment for each such Change. In the event that any Subcontractor, of any tier, shall provide or perform any portion of any Change to the Work, Contractor shall require that each such Subcontractor maintain records in accordance with this Article. Each daily record maintained hereunder shall be signed by Contractor's Superintendent or Contractor's authorized representative; such signature shall be deemed Contractor's representation and warranty that all information contained therein is true, accurate, complete and relate only to the Change referenced therein. All records maintained by a Subcontractor, of any tier, relating to the costs of a Change to the Work shall be signed by such Subcontractor's authorized representative or Superintendent. All records maintained hereunder shall be subject to inspection, review and/or reproduction by the District, the Architect or the District's Inspector upon request. In the event that Contractor shall fail or refuse, for any reason, to maintain or make available for inspection, review and/or reproduction such records and the adjustment to the Contract Price on account of any Change to the Work
is determined pursuant to this Article, the District's reasonable good faith determination
of the extent of adjustment to the Contract Price on account of such Change shall be
final, conclusive, dispositive and binding upon Contractor. Contractor's obligation to
maintain records hereunder is in addition to, and not in lieu of, any other Contractor
obligation under the Contract Documents with respect to Changes to the Work.

9.4.2 Adjustment to Contract Time. In the event of any Change(s) to the Work pursuant
to this Article 9, the Contract Time shall be extended or reduced by Change Order for a
period of time commensurate with the time reasonably necessary to perform such Change.
Such time shall be requested in writing by the Contractor with the Contract price Adjustment
Proposal. The time extension request shall be justified by the Contractor by submittal of a
CPM analysis accurately portraying the impact of the change on the critical path of the
project schedule. Changes performed within available float as indicated in the updated
Approved Construction Schedule shall not justify a time extension to the Contract. When
agreement is reached between the District and Contractor that a Change shall require an
extension of the contract time, the Contractor shall not be subject to Liquidated Damages for
such period of time. If completion of the Work is delayed by causes for which the District is
responsible and the delay is unreasonable under the circumstances involved, and not within
the contemplation of the Contractor and the District at the time of execution of the
Agreement, the Contractor shall not be precluded from the recovery of damages arising
therefrom.

9.4.3 Addition or Deletion of Alternate Bid Item(s). If the Bid for the Work includes
proposal(s) for Alternate Bid Item(s), during Contractor's performance of the Work, the
District may elect, pursuant to this Article to add any such Alternate Bid Item(s) if the same
did not form a basis for award of the Contract or delete any such Alternate Bid Item(s) if the
same formed a basis for award of the Contract. If the District elects to add or delete any
such Alternate Bid Item(s) pursuant to the foregoing, the cost or credit for such Alternate Bid
Item(s) shall be as set forth in the Contractor's Bid.

9.5 Change Orders. If the District approves of a Change, a written Change Order prepared on
behalf of the District shall be forwarded to the Contractor describing the Change and setting forth
the adjustment to the Contract Time and the Contract Price, if any, on account of such Change. All
Change Orders shall be in full payment and final settlement of all claims for direct, indirect and
consequential costs, including without limitation, costs of delays or impacts related to, or arising out
of, items covered and affected by the Change Order, as well as any adjustments to the Contract
Time. Any claim or item relating to any Change incorporated into a Change Order not presented by
the Contractor for inclusion in the Change Order shall be deemed waived. The Contractor shall
execute the Change Order prepared pursuant to the foregoing; once the Change Order has been
prepared and forwarded to the Contractor for execution, without the prior approval of the District
which may be granted or withheld in the sole and exclusive discretion of the District, the Contractor
shall not modify or amend the form or content of such Change Order, or any portion thereof. The
Contractor's attempted or purported modification or amendment of any such Change Order, without
the prior approval of the District, shall not be binding upon the District; any such unapproved
modification or amendment to such Change Order shall be null, void and unenforceable. Unless
otherwise expressly provided for in the Contract Documents or in the Change Order, any Change
Order issued hereunder shall be binding upon the District only upon action of the District's Board of Trustees approving and ratifying such Change Order. In the event of any amendment or modification made by the Contractor to a Change Order for which there is no prior approval by the District, in accordance with the provisions of this Article 9.5, unless otherwise expressly stated in its approval and ratification of such Change Order, any action of the Board of Trustees to approve and ratify such Change Order shall be deemed to be limited to the Change Order as prepared by the Architect or Construction Manager; such approval and ratification of such Change Order shall not be deemed the District's approval and ratification of any unapproved amendment or modification by the Contractor to such Change Order.

9.6 Contractor Notice of Changes. If the Contractor should claim that any instruction, request, the Drawings, the Specifications, action, condition, omission, default, or other situation obligates the District to increase the Contract Price or to extend the Contract Time, the Contractor shall notify the District's Construction Manager and the Architect, in writing, of such claim within ten (10) days from the date of its actual or constructive notice of the factual basis supporting the same. The District shall consider any such claim of the Contractor only if sufficient supporting documentation is submitted with the Contractor's notice to the District's Construction Manager and the Architect. Time is of the essence in Contractor's written notice pursuant to the preceding sentence so that the District can promptly investigate and consider alternative measures to address such instruction, request, Drawings, Specifications, action, condition, omission, default or other situation. Accordingly, Contractor acknowledges that its failure, for any reason, to give written notice (with sufficient supporting documentation to permit the District's review and evaluation) within ten (10) days of its actual or constructive knowledge of any instruction, request, Drawings, Specifications, action, condition, omission, default or other situation for which the Contractor believes there should an adjustment of the Contract Time or the Contract Price shall be deemed Contractor's waiver, release, discharge and relinquishment of any right to assert or claim any entitlement to an adjustment of the Contract Time or the Contract Price on account of any such instruction, request, Drawings, Specifications, action, condition, omission, default or other situation. In the event that the District determines that the Contract Price or the Contract Time are subject to adjustment based upon the events, circumstances and supporting documentation submitted with the Contractor's written notice under this Article 9.6, any such adjustment shall be determined in accordance with the provisions of Articles 9.4.1 and 9.4.2.

9.7 Disputed Changes. In the event of any dispute or disagreement between the Contractor and the District or the Architect regarding the characterization of any item as a Change to the Work or as to the appropriate adjustment of the Contract Price or the Contract Time on account thereof, the Contractor shall promptly proceed with the performance of such item of the Work, subject to a subsequent resolution of such dispute or disagreement in accordance with the terms of the Contract Documents. The Contractor's failure or refusal to so proceed with such Work may be deemed to be Contractor's default of a material obligation of the Contractor under the Contract Documents.

9.8 Emergencies. In an emergency affecting the safety of life, or of the Work, or of property, the Contractor, without special instruction or prior authorization from the District or the Architect, is permitted to act at its discretion to prevent such threatened loss or injury. Any compensation claimed by the Contractor on account of such emergency work shall be submitted and determined in accordance with this Article 9.
9.9 **Minor Changes in the Work.** The Architect may order minor Changes in the Work not involving an adjustment in the Contract Price or the Contract Time and not inconsistent with the intent of the Contract Documents. Such Changes shall be effected by written order and shall be binding on the District and the Contractor. The Construction Manager or the District's Inspector may direct the Contractor to perform Changes provided that each such Change does not result in an increase of more than $500.00 to the Contract Price and no adjustment of the Contract Time. The Contractor shall carry out such orders promptly.

9.10 **Unauthorized Changes.** Any Work beyond the lines and grades shown on the Contract Documents, or any extra Work performed or provided by the Contractor without notice to the Architect and the District's Inspector in the manner and within the time set forth in Articles 9.2 or 9.6 shall be considered unauthorized and at the sole expense of the Contractor. Work so done will not be measured or paid for, no extension to the Contract Time will be granted on account thereof and any such Work may be ordered removed at the Contractor's sole cost and expense. The failure of the District to direct or order removal of such Work shall not constitute acceptance or approval of such Work nor relieve the Contractor from any liability on account thereof.

**ARTICLE 10: SEPARATE CONTRACTORS**

10.1 **District's Right to Award Separate Contracts.** The District reserves the right to perform construction or operations related to the Project with the District's own forces or to award separate contracts in connection with other portions of the Project or other construction or operations at or about the Site. If the Contractor claims that delay or additional cost is involved because of such action by the District, the Contractor shall seek an adjustment to the Contract Price or the Contract Time as provided for in the Contract Documents. Failure of the Contractor to request such an adjustment of the Contract Time or the Contract Price in strict conformity with the provisions of the Contract Documents applicable thereto shall be deemed a waiver of the same.

10.2 **District's Coordination of Separate Contractors.** The District shall provide for coordination of the activities of the District's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the District in reviewing their respective Construction Schedules when directed to do so. The Contractor shall make any revisions to the Approved Construction Schedule for the Work hereunder deemed necessary after a joint review and mutual agreement. The Construction Schedules shall then constitute the Construction Schedules to be used by the Contractor, separate contractors and the District until subsequently revised.

10.3 **Mutual Responsibility.** The Contractor shall afford the District and separate contractors reasonable opportunity for storage of their materials and equipment and performance of their activities at the Site and shall connect and coordinate the Contractor's Work, construction and operations with theirs as required by the Contract Documents.

10.4 **Discrepancies or Defects.** If part of the Contractor's Work depends for proper execution or results upon construction or operations by the District or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Construction Manager any apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor to so report shall constitute an
acknowledgment that the District's or separate contractors' completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then discoverable by the Contractor's reasonable diligence.

ARTICLE 11: TESTS AND INSPECTIONS

11.1 Tests; Inspections; Observations.

11.1.1 Contractor's Notice. If the Contract Documents, laws, ordinances or any public authority with jurisdiction over the Work requires the Work, or any portion thereof, to be specially tested, inspected or approved, the Contractor shall give the Construction Manager written notice of the readiness of such Work for observation, testing or inspection at least two (2) working days prior to the time for the conducting of such test, inspection or observation. If inspection, testing or observation is by authority other than the District, the Contractor shall inform the District's Inspector and the Construction Manager not less than two (2) working days prior to the date fixed for such inspection, test or observation. The Contractor shall not cover up any portion of the Work subject to tests, inspections or observations prior to the completion and satisfaction of the requirements of such test, inspection or observation. In the event that any portion of the Work subject to tests, inspection or approval shall be covered up by Contractor prior to completion and satisfaction of the requirements of such tests, inspection or approval, Contractor shall be responsible for the uncovering of such portion of the Work as is necessary for performing such tests, inspection or approval without adjustment of the Contract Price or the Contract Time on account thereof.

11.1.2 Cost of Tests and Inspections. Costs for tests and inspection of materials shall be paid by the District as provided for herein. Should any act, omission or other conduct of the Contractor, any of its Subcontractors, of any tier, or Material Suppliers cause the number of hours or the costs of such tests or inspections to be excessive, the Contractor shall be solely responsible for all such excess costs and the District may deduct such amount from any portion of the Contract Price then or thereafter due the Contractor. The District will pay for all tests and inspections provided that, in addition to the cost to be paid by the Contractor previously set forth in this Article, the Contractor shall pay for all tests and inspections under any of the following conditions: (i) when such costs are stipulated in the provisions of the Contract Documents to be borne by the Contractor; (ii) when a material is tested or inspected and fails to meet the requirements of the Specifications and/or Drawings; or (iii) when the source of the material is changed after the original test or inspection has been made or approved.

11.1.3 Testing/Inspection Laboratory. The District shall select duly qualified person(s) or testing laboratory(ies) to conduct the tests and inspections to be paid for by the District and required by the Contract Documents. All such tests and inspections shall be in conformity with the latest adopted Title 24 of the California Code of Regulations. Where inspection or testing is to be conducted by an independent laboratory or testing agency, materials or samples thereof shall be selected by the laboratory, testing agency, the District's Inspector, the Construction Manager or the Architect and not by the Contractor.
11.1.4 Additional Tests, Inspections and Approvals. If the Architect, the Construction Manager, the District's Inspector or public authorities having jurisdiction over the Work determine that portions of the Work require additional testing, inspection or approval, the Construction Manager shall instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the District, and the Contractor shall give timely notice to the Construction Manager of when and where tests and inspections are to be made so the District's Inspector and the Architect may observe such procedures. The District shall bear the costs of such additional tests, inspections or approvals, except to the extent that such additional tests, inspections or approvals reveal any failure of the Work to comply with the requirements of the Contract Documents, in which case the Contractor shall bear all costs made necessary by such failures, including without limitation, the costs of corrections, repeat tests, inspections or approvals and the costs of the Architect's services or its consultants in connection therewith. Where required DSA testing of the work identifies a failure rate of ten percent (10%) or greater for any system, scope of work, installation or subtrade that has been specifically targeted, District may, at its sole discretion, order that all such similar systems, installations, scopes of work or subtrade work used in connection with the Project be tested, and the cost to test all such work shall be paid by the Contractor.

11.2 Delivery of Certificates. Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect. If a material is not required to be tested, the Architect, Inspector or the District may require Contractor to furnish a certificate bearing the official and legal signature of the supplier with each delivery of such material, which certificate shall state that the material complies with the Specifications.

11.3 Timeliness of Tests, Inspections and Approvals. Tests or inspections required and conducted pursuant to the Contract Documents shall be made or arranged by Contractor to avoid delay in the progress of the Work.

ARTICLE 12: UNCOVERING AND CORRECTION OF WORK

12.1 Inspection of the Work.

12.1.1 Access to the Work. All Work and all materials and equipment forming a part of the Work or incorporated into the Work are subject to inspection by the District, the Construction Manager, the Architect and the District's Inspector for conformity with the Contract Documents. The Contractor shall, at its cost and without adjustment to the Contract Price or the Contract Time, furnish any facilities necessary for sufficient and safe access to the Work for purposes of inspection by the District, the Construction Manager, the Architect, the District's Inspector, DSA or any other public or quasi-public authority with jurisdiction over the Work or any portion thereof.

12.1.2 Limitations Upon Inspections. Inspections, tests, measurements, or other acts of the Architect and the District's Inspector hereunder are for the sole purpose of assisting them in determining that the Work, materials, equipment, progress of the Work, and quantities generally comply and conform with the requirements of the Contract Documents. These acts
or functions shall not relieve the Contractor from performing the Work in full compliance with the Contract Documents. No inspection by the Architect or the District's Inspector shall constitute or imply acceptance of Work inspected. Inspection of the Work hereunder is in addition to, and not in lieu of, any other testing, inspections or approvals of the Work required under the Contract Documents.

12.2 Uncovering of Work. If any portion of the Work is covered contrary to the request of the Architect, the District's Inspector, the Construction Manager or the requirements of the Contract Documents, it must be uncovered by the Contractor for observation by such District representative and be replaced by the Contractor without adjustment of the Contract Time or the Contract Price.

12.3 Rejection of Work. Prior to the District's Final Acceptance of the Work, any Work or materials or equipment forming a part of the Work or incorporated into the Work which is defective or not in conformity with the Contract Documents may be rejected by the District, the Construction Manager, the Architect or the District's Inspector and the Contractor shall correct such rejected Work without any adjustment to the Contract Price or the Contract Time, even if the Work, materials or equipment have been previously inspected by the Architect or the District's Inspector or even if they failed to observe the defective or non-conforming Work, materials or equipment.

12.4 Correction of Work. The Contractor shall promptly correct any portion of the Work rejected by the District, the Construction Manager, the Architect or the District's Inspector for failing to conform to the requirements of the Contract Documents, or which is determined by them to be defective, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The Contractor shall bear all costs of correcting such rejected Work, including additional testing and inspections and compensation for the Architect's or Inspector's services and expenses made necessary thereby. The Contractor shall bear all costs of correcting destroyed or damaged construction, whether completed or partially completed, of the District or separate contractors, caused by the Contractor's correction or removal of Work which is not in accordance with the requirements of the Contract Documents, or which is defective.

12.5 Removal of Non-Conforming or Defective Work. The Contractor shall, at its sole cost and expense, remove from the Site all portions of the Work which are defective or are not in accordance with the requirements of the Contract Documents which are neither corrected by the Contractor nor accepted by the District.

12.6 Failure of Contractor to Correct Work. If the Contractor fails to commence to correct defective or non-conforming Work within three (3) days of notice of such condition and promptly thereafter complete the same within a reasonable time, the District may correct it in accordance with the Contract Documents. If the Contractor does not so proceed, the District may remove it and store the salvable materials or equipment at the Contractor's expense. If the Contractor does not pay costs of such removal and storage after written notice, the District may sell such materials or equipment at auction or at private sale and shall account for the proceeds thereof, after deducting costs and damages that should have been borne by the Contractor, including without limitation compensation for the Architect's and Inspector’s services, attorneys fees and other expenses made necessary thereby. If such proceeds of sale do not cover costs which the Contractor should have borne, the Contract Price shall be reduced by the deficiency. If payments of the Contract Price then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor and the Surety
shall promptly pay the difference to the District.

12.7 Acceptance of Defective or Non-Conforming Work. The District may, in its sole and exclusive discretion, elect to accept Work which is defective or which is not in accordance with the requirements of the Contract Documents, instead of requiring its removal and correction, in which case the Contract Price shall be reduced as appropriate and equitable.

ARTICLE 13: WARRANTIES

13.1 Workmanship and Materials. The Contractor warrants to the District that all materials and equipment furnished under the Contract Documents shall be new, of good quality and of the most suitable grade and quality for the purpose intended, unless otherwise specified in the Contract Documents. All Work shall be of good quality, free from faults and defects and in conformity with the requirements of the Contract Documents. If required by the District, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment incorporated into the Work. Any Work, or portion thereof not conforming to these requirements, including substitutions or alternatives not properly approved in accordance with the Contract Documents may be deemed defective. Where there is an approved substitution of, or alternative to, material or equipment specified in the Contract Documents, the Contractor warrants to the District that such installation, construction, material, or equipment will equally perform the function and have the quality of the originally specified material or equipment. The Contractor expressly warrants the merchantability, the fitness for use, and quality of all substitute or alternative items in addition to any warranty given by the manufacturer or supplier of such item.

13.2 Warranty Work. If, within one year after the date of Final Acceptance, or such other time frame set forth elsewhere in the Contract Documents, any of the Work is found to be defective or not in accordance with the requirements of the Contract Documents, or otherwise contrary to the warranties contained in the Contract Documents, the Contractor shall commence all necessary corrective action not more than seven (7) days after receipt of a written notice from the District to do so, and to thereafter diligently complete the same. In the event that Contractor shall fail or refuse to commence correction of any such item within said seven (7) day period or to diligently prosecute such corrective actions to completion, the District may, without further notice to Contractor, cause such corrective Work to be performed and completed. In such event, Contractor and Contractor's Performance Bond Surety shall be responsible for all costs in connection with such corrective Work, including without limitation, general administrative overhead costs of the District in securing and overseeing such corrective Work. Nothing contained herein shall be construed to establish a period of limitation with respect to any obligation of the Contractor under the Contract Documents. The obligations of the Contractor hereunder shall be in addition to, and not in lieu of, any other obligations imposed by any special guarantee or warranty required by the Contract Documents, guarantees or warranties provided by any manufacturer of any item or equipment forming a part of, or incorporated into the Work, or otherwise recognized, prescribed or imposed by law. Neither the District's Final Acceptance, the making of Final Payment, any provision in Contract Documents, nor the use or occupancy of the Work, in whole or in part, by District shall constitute acceptance of Work not in accordance with the Contract Documents nor relieve the Contractor or the Contractor's Performance Bond Surety from liability with respect to any warranties or responsibility for faulty or defective Work or materials, equipment and workmanship incorporated therein.
13.3 **Guarantee.** Upon completion of the Work, Contractor shall execute and deliver to the District the form of Guarantee included within the Contract Documents. The Contractor's execution and delivery of the form of Guarantee is an express condition precedent to any obligation of the District to disburse the Final Payment to the Contractor.

13.4 **Survival of Warranties.** The provisions of this Article 13 shall survive the Contractor's completion of Work under the Contract Documents, the District's Final Acceptance or the termination of the Contract.

**ARTICLE 14: SUSPENSION OF WORK**

14.1 **District's Right to Suspend Work.** The District may, without cause and without invalidating or terminating the Contract, order the Contractor, in writing, to suspend, delay or interrupt the Work in whole or in part for such period of time as the District may determine. The Contractor shall resume and complete the Work suspended by the District in accordance with the District's directive, whether issued at the time of the directive suspending the Work or subsequent thereto.

14.2 **Adjustments to Contract Price and Contract Time.** If the District orders a suspension of the Work, an adjustment shall be made to the Contract Price for increases in the direct cost of performance of the Work of the Contract Documents actually caused by suspension, delay or interruption ordered by the District; provided however that no adjustment of the Contract Price shall be made to the extent: (i) that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible under the Contract Documents; or (ii) that an equitable adjustment is made or denied under another provision of the Contract Documents. Any such adjustment of the Contract Price shall not include any adjustment to increase the Contractor's overhead, general administrative costs or profit, all of which will remain as reflected in the Cost Breakdown submitted by the Contractor pursuant to the Contract Documents. In the event of the District's suspension of the Work, the Contract Time shall be equitably adjusted.

**ARTICLE 15: TERMINATION**

15.1 **Termination for Cause.**

15.1.1 **District's Right to Terminate.** The District may terminate the Contract upon the occurrence of any one or more of the following events of the Contractor's default: (i) if the Contractor refuses or fails to prosecute the Work with diligence as will ensure Substantial Completion of the Work within the Contract Time, or if the Contractor fails to substantially Complete the Work within the Contract Time; (ii) if the Contractor becomes bankrupt or insolvent, or makes a general assignment for the benefit of creditors, or if the Contractor or a third party files a petition to reorganize or for protection under any bankruptcy or similar laws, or if a trustee or receiver is appointed for the Contractor or for any of the Contractor's property on account of the Contractor's insolvency, and the Contractor or its successor in interest does not provide adequate assurance of future performance in accordance with the Contract Documents within 10 days of receipt of a request for such assurance from the District; (iii) if the Contractor repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment; (iv) if the Contractor repeatedly fails to make prompt
payments to any Subcontractor, of any tier, or Material Suppliers or others for labor, materials or equipment; (v) if the Contractor disregards laws, ordinances, rules, codes, regulations, orders applicable to the Work or similar requirements of any public entity having jurisdiction over the Work; (iv) if the Contractor disregards proper directives of the Architect, the District's Inspector or District under the Contract Documents; (vii) if the Contractor performs Work which deviates from the Contract Documents and neglects or refuses to correct such Work; or (viii) if the Contractor otherwise violates in any material way any provisions or requirements of the Contract Documents. Once the District determines that sufficient cause exists to justify the action, the District may terminate the Contract without prejudice to any other right or remedy the District may have, after giving the Contractor and the Surety at least seven (7) days advance written notice of the effective date of termination. The District shall have the sole discretion to permit the Contractor to remedy the cause for the termination without waiving the District's right to terminate the Contract, or otherwise waiving, restricting or limiting any other right or remedy of the District under the Contract Documents or at law.

15.1.2 District's Rights Upon Termination. In the event that the Contract is terminated pursuant to this Article 15.1, the District may take over the Work and prosecute it to completion, by contract or otherwise, and may exclude the Contractor from the site. The District may take possession of the Work and of all of the Contractor's tools, appliances, construction equipment, machinery, materials, and plant which may be on the site of the Work, and use the same to the full extent they could be used by the Contractor without liability to the Contractor. In exercising the District's right to prosecute the completion of the Work, the District may also take possession of all materials and equipment stored at the site of the Work or for which the District has paid the Contractor but which are stored elsewhere, and finish the Work as the District deems expedient. In exercising the District's right to prosecute the completion of the Work, the District shall have the right to exercise its sole discretion as to the manner, methods, and reasonableness of the costs of completing the Work and the District shall not be required to obtain the lowest figure for completion of the Work. In the event that the District takes bids for remedial Work or completion of the Work, the Contractor shall not be eligible for the award of such contract(s).

15.1.3 Completion by the Surety. In the event that the Contract is terminated pursuant to this Article 15.1, the District may demand that the Surety take over and complete the Work. The District may require that in so doing, the Surety not utilize the Contractor in performing and completing the Work. Upon the failure or refusal of the Surety to take over and begin completion of the Work within fifteen (15) days after demand therefor, the District may take over the Work and prosecute it to completion as provided for above. Such remedy is in addition to, and not lieu of, other remedies available to District as provided by law or in equity.

15.1.4 Assignment and Assumption of Subcontracts. The District shall, in its sole and exclusive discretion, have the option of requiring any Subcontractor or Material Supplier to perform in accordance with its Subcontract or Purchase Order with the Contractor and assign the Subcontract or Purchase Order to the District or such other person or entity selected by the District to complete the Work.
15.1.5 Costs of Completion. In the event of termination under this Article 15.1, the Contractor shall not be entitled to receive any further payment of the Contract Price until the Work is completed. If the unpaid balance of the Contract Price as of the date of termination exceeds the District's direct and indirect costs and expenses for completing the Work, including without limitation, attorneys' fees and compensation for additional professional and consultant services, such excess shall be used to pay the Contractor for the cost of the Work performed prior to the effective date of termination with a reasonable allowance for overhead and profit. If the District's costs and expenses to complete the Work exceed the unpaid Contract Price, the Contractor and/or the Surety shall pay the difference to the District.

15.1.6 Contractor Responsibility for Damages. The Contractor and the Surety shall be liable for all damage sustained by the District resulting from, in any manner, the termination of Contract under this Article 15.1, including without limitation, attorneys' fees, and for all costs necessary for repair and completion of the Work over and beyond the Contract Price.

15.1.7 Conversion to Termination for Convenience. In the event the Contract is terminated under this Article 15.1, and it is determined, for any reason, that the Contractor was not in default under the provisions hereof, the termination shall be deemed a Termination for Convenience of the District and thereupon, the rights and obligations of the District and the Contractor shall be determined in accordance with Article 15.2 hereof.

15.1.8 District's Rights Cumulative. In the event the Contract is terminated pursuant to this Article 15.1, the termination shall not affect or limit any rights or remedies of the District against the Contractor or the Surety. The rights and remedies of the District under this Article 15.1 are in addition to, and not in lieu of, any other rights and remedies provided by law or otherwise under the Contract Documents. Any retention or payment of monies to the Contractor by the District shall not be deemed to release the Contractor or the Surety from any liability hereunder.

15.2 Termination for Convenience of the District. The District may at any time, in its sole and exclusive discretion, by written notice to the Contractor, terminate the Contract in whole or in part when it is in the interest of, or for the convenience of, the District. In such case, the Contractor shall be entitled to payment for: (i) Work actually performed and in place as of the effective date of such termination for convenience of the District, with a reasonable allowance for profit and overhead on such Work, and (ii) reasonable termination expenses for reasonable protection of Work in place and suitable storage and protection of materials and equipment delivered to the site of the Work but not yet incorporated into the Work, provided that such payments exclusive of termination expenses shall not exceed the total Contract Price as reduced by payments previously made to the Contractor and as further reduced by the value of the Work as not yet completed. The Contractor shall not be entitled to profit and overhead on Work which was not performed as of the effective date of the termination for convenience of the District. The District may, in its sole discretion, elect to have subcontracts assigned pursuant to Article 15.1.4 above after exercising the right hereunder to terminate for the District’s convenience.

ARTICLE 16: MISCELLANEOUS
16.1 **Governing Law.** This Contract shall be governed by and interpreted in accordance with the laws of the State of California.

16.2 **Successors and Assigns.** Except as otherwise expressly provided in the Contract Documents, all terms, conditions and covenants of the Contract Documents shall be binding upon, and shall inure to the benefit of the District and the Contractor and their respective heirs, representatives, successors-in-interest and assigns.

16.3 **Cumulative Rights and Remedies; No Waiver.** Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not in lieu of or otherwise a limitation or restriction of duties, obligations, rights and remedies otherwise imposed or available by law. No action or failure to act by the District shall constitute a waiver of a right or remedy afforded it under the Contract Documents or at law nor shall such an action or failure to act constitute approval of or acquiescence in a breach hereunder, except as may be specifically agreed in writing.

16.4 **Severability.** In the event any provision of the Contract Documents shall be deemed illegal, invalid, unenforceable and/or void, by a court or any other governmental agency of competent jurisdiction, such provision shall be deemed to be severed and deleted from the Contract Documents, but all remaining provisions hereof, shall in all other respects, continue in full force and effect.

16.5 **No Assignment by Contractor.** The Contractor shall not sublet or assign the Contract, or any portion thereof, or any monies due thereunder, without the express prior written consent and approval of the District, which approval may be withheld in the sole and exclusive discretion of the District. The District's approval to such assignment shall be upon such terms and conditions as determined by the District in its sole and exclusive discretion.

16.6 **Independent Contractor Status.** In performing its obligations under the Contract Documents, the Contractor is an independent contractor to the District and not an agent or employee of the District.

16.7 **Notices.** Except as otherwise expressly provided for in the Contract Documents, all notices which the District or the Contractor may be required, or may desire, to serve on the other, shall be effective only if delivered by personal delivery or by postage prepaid, First Class Certified Return Receipt Requested United States Mail, addressed to the District or the Contractor at their respective address set forth in the Contract Documents, or such other address(es) as either the District or the Contractor may designate from time to time by written notice to the other in conformity with the provisions hereof. In the event of personal delivery, such notices shall be deemed effective upon delivery, provided that such personal delivery requires a signed receipt by the recipient acknowledging delivery of the same. In the event of mailed notices, such notice shall be deemed effective on the third working day after deposit in the mail.

16.8 **Disputes; Continuation of Work.** Notwithstanding any claim, dispute or other disagreement between the District and the Contractor regarding performance under the Contract Documents, the scope of Work thereunder, or any other matter arising out of or related to, in any manner, the Contract Documents, the Contractor shall proceed diligently with performance of the Work in accordance with the District's written direction, pending any final determination or decision regarding any such claim, dispute or disagreement.
16.9 Dispute Resolution; Claims Under $375,000.00. Claims between the District and the Contractor of $375,000.00 or less shall be resolved in accordance with the procedures established in Part 3, Chapter 1, Article 1.5 of the California Public Contract Code, §§20104 et seq.; provided however that California Public Contract Code §20104.2(a) shall not supersede the requirements of the Contract Documents with respect to the Contractor's notification to the District of such claim or extend the time for the giving of such notice as provided in the Contract Documents. The term "claims" as used herein shall be as defined in California Public Contract Code §20104(b)(2).

16.10 Attorneys Fees. Except as expressly provided for in the Contract Documents, or authorized by law, neither the District nor the Contractor shall recover from the other any attorneys fees or other costs associated with or arising out of any legal, administrative or other proceedings filed or instituted in connection with or arising out of the Contract Documents or the performance of either the District or the Contractor thereunder.

16.11 Marginal Headings; Interpretation. The titles of the various Articles of these General Conditions and elsewhere in the Contract Documents are used for convenience of reference only and are not intended to, and shall in no way, enlarge or diminish the rights or obligations of the District or the Contractor and shall have no effect upon the construction or interpretation of the Contract Documents. The Contract Documents shall be construed as a whole in accordance with their fair meaning and not strictly for or against the District or the Contractor.

16.12 Provisions Required by Law Deemed Inserted. Each and every provision of law and clause required by law to be inserted in the Contract Documents is deemed to be inserted herein and the Contract Documents shall be read and enforced as though such provision or clause are included herein, and if through mistake, or otherwise, any such provision or clause is not inserted or if not correctly inserted, then upon application of either party, the Contract Documents shall forthwith be physically amended to make such insertion or correction.

16.13 Entire Agreement. The Contract Documents contain the entire agreement and understanding between the District and the Contractor concerning the subject matter hereof, and supersedes and replaces all prior negotiations, proposed agreements or amendments, whether written or oral. No amendment or modification to any provision of the Contract Documents shall be effective or enforceable except by an agreement in writing executed by the District and the Contractor.

END OF SECTION
SECTION 00800

SPECIAL CONDITIONS

PART 1

1.01 Contract Time.

A. **Substantial Completion of the Work.** The Work shall be commenced on the date stated in the Notice to Proceed issued by the District to the Contractor and shall be completed (**Substantial Completion**) within **SIXTY FOUR (64)** consecutive calendar days from and after the date stated in the Notice to Proceed (Reference Article 7 of the General Conditions). Total contract time is **SEVENTY NINE (79)** consecutive calendar days.

B. **Interim Milestone Completion Dates.** Notwithstanding any provision of the Contract Documents to the contrary, Contractor shall sequence and coordinate the work so that portions of the work are completed as required by the Work Segment Plan in accordance with start and completion dates indicated on Section 01010 and Exhibit “A”.

1.02 Liquidated Damages.

A. **Delayed Completion of the Work.** Pursuant to Article 7 of the General Conditions, the Contractor shall be subject to the assessment and withholding of Liquidated Damages for failure to achieve Substantial Completion of the Work within the Contract Time as indicated in item 1.01.A, above. Liquidated Damages shall be at the rate of **$2000.00** per day until Work of Construction Segments IA and IB as defined on Section 01010 is achieved.

B. **Delayed Final Completion of the Work.** Pursuant to Article 7 of the General Conditions, the Contractor shall be subject to the assessment and withholding of Liquidated Damages for failure to achieve Final Completion of the Work in accordance with the Contract Documents. Liquidated Damages shall be at the rate of **$2,000.00** per day until Final Completion of the Work is achieved.

C. **Delayed Submittals.** The per day assessment of Liquidated Damages for Contractor’s delayed submission of Submittals pursuant to Article 4.8.2.1 of the General Conditions is **$1000.00** per day per Submittal until the required Submittal is submitted.

D. **Cumulative Assessment of Liquidated Damages.** If the Contractor fails to timely delivery of the Submittals, fails to achieve Final Completion of the Work Segments as set forth herein, or fails to achieve Substantial or Final Completion of the Work, the Contractor shall be subject to assessment and withholding of Liquidated Damages in the amounts set forth above for each such portion of the Work which is not timely delivered or completed within the time allocated for each
portion of the Work.

1.03 Insurance

Insurance Provided By District.
Not Applicable.

B. Insurance Provided by Contractors/Subcontractors.
Pursuant to Article 6.12 of the General Conditions, the Contractor, all Subcontractors and Sub-Subcontractors (except Excluded Parties covered under Article 6.18) shall provide and maintain the following insurance coverage’s, with minimum coverage amounts as set forth below:

1. Workers Compensation Insurance
   In accordance with limits established by law.

2. Employers Liability Insurance
   $2,000,000

3. Commercial General Liability Insurance
   Per Occurrence $1,000,000
   Aggregate $2,000,000

4. Automobile Liability
   Bodily Injury/Property Damage per Occurrence $1,000,000

5. Aircraft Liability Insurance (if applicable)
   Per Occurrence $5,000,000
   Aggregate $5,000,000

C. Insurance Provided by Excluded Parties.
Pursuant to Article 6.18 of the General Conditions, the Excluded Parties shall provide and maintain the following insurance coverage’s, with minimum coverage amounts as set forth below:

1. Workers Compensation Insurance
   In accordance with limits established by law.

2. Employers Liability Insurance
   $1,000,000

3. Commercial General Liability Insurance
   Per Occurrence $1,000,000
   Aggregate $3,000,000

4. Automobile Liability
   Bodily Injury/Property Damage Per Occurrence $1,000,000
5. Aircraft Liability Insurance (if applicable)
   Per Occurrence $5,000,000
   Aggregate $5,000,000

D. Pollution Legal Liability Insurance.
Pursuant to Article 6.21 of the General Conditions, the Excluded Parties shall provide and maintain the following insurance coverage’s, with minimum coverage amounts as set forth below:

   Per Occurrence $5,000,000
   Aggregate $5,000,000

1.04 Drawings and Specifications.

The number of sets of the Drawings and Specifications which the District will provide to the Contractor pursuant to Article 2.1.2 of the General Conditions is one (1) set of reproducible specifications with plans which can be downloaded of the website at http://www.riohondo.edu/facilities/RFQ/index.htm

Website above is the official record of the bid documents. Contractor is responsible for downloading all drawings, specifications, addendum etc from the above mentioned website.

1.05 Mark-ups on Changes to the Work.

A. In the event of Changes to the Work, pursuant to Article 9 of the General Conditions, the mark-up for all overhead (including home and field office overhead), general conditions costs and profit, shall not exceed five percent (5%) of the direct actual costs if the General Contractor performed the work, five percent (5%) if the sub-contractor performed the work, as determined in accordance with Article 9.4 of the General conditions. Sub-contractor overhead and profit shall / will not exceed Five percent (5%) for self performed work and Five percent (5%) for work preformed by others. The foregoing limitation on mark-ups shall apply regardless of the number of Subcontractors, of any tier, performing any portion of such Change to the Work. In addition to the foregoing, Contractor may add a bond premium fee of the actual direct cost of the bond for such Change, not to exceed two percent (2%), of the actual direct costs for performance of the Change and the maximum allowable mark-up for overhead, general conditions and profit.

B. Deleted Work: All deductive change order(s) must be prepared pursuant to Contract Documents. Deductive Change Orders must be at a fair cost value to the district and shall credit back all mark-ups to the district along with the actual scope of work. General contractor and all subcontractors shall not be entitled to any profit and overhead on the deducted work.

1.06 Inclement Weather Days.

Pursuant to Article 7.4.1 of the General Conditions, the number of Rain Days (including inclement weather) for this Contract is 3 days. Include a critical path activity entitled
“Remaining Inclement Weather Days” on the initial Contract schedule. This activity shall have an initial duration of Three (3) work days and shall be the last activity in the schedule prior to the activity entitled “Completion”. All predecessor activities must pass through the Inclement Weather day’s activity. The Contractor shall request use of the Inclement Weather Day when a critical path activity has been delayed due to inclement weather. This request must occur in the same month as the inclement weather delay and must be approved by a Change Order. Inclement Weather Delays to non-critical activities will not be considered. If, at completion, there are inclement weather days still remaining, the Completion date shall not be adjusted. If at or near completion, additional inclement weather days are required, the completion date shall be adjusted accordingly by processing a Change Order for a non-compensable time extension.

1.07 District’s Construction Manager.

The District’s Construction Manager is: Del Terra Program Management Team.

PART 2

2.0 Construction operations, phasing, execution and Special Provisions

This Section supersedes other general conditions where applicable.

2.1 Project Limits.

The Contractor will limit its operations to the area included in the Contract Documents. All contractor lay-down, construction work and operations will be limited to the area as directed by the Construction Manager, Approved by Del Terra Program Management Team.

2.2 Hours of Operation

Work will be coordinated with Construction Manager & College for minimum disruption to College operations and shall be performed during normal business working hours; Monday to Friday from 6:00 AM to 6:00 PM. All off-hour work or weekend work must be approved by the College through the Construction Manager at least two days in advance.

2.3 Construction Traffic Route

Contractor to use pre-determined construction traffic routes as approved by the College.

2.4 Progress Schedule; Contractor Responsibility for Construction Schedule

CONTRACTOR shall be responsible for the preparation, submittal and maintenance of Construction Schedules required by the Contract Documents according but not limited to Section 01320, CONSTRUCTION PROGRESS DOCUMENTATION as included in Division 01 of the Bid Documents. All pertinent provisions of the General Conditions apply.
2.5 Phasing

A Work will be performed in such a manner as to minimize impact to normal college operations. Any phase/segment shall be required to be completed according to the approved Milestones Schedule.

B Contractor shall submit a “work to complete” list to the Construction Manager 5 calendar days before the scheduled end of any phase. The Construction Manager and the Architect will comment and add items to the list as necessary. The contractor shall complete the “work to complete” list within 3 days after having received the list from the Construction Manager. The contractor shall request a punch list walk 5 days prior to the scheduled end of any phase/segment.

C During the performance of this contract, the college and facilities operations will be ongoing and will remain under normal operations. Work will be permitted during school hours, provided that safe access to and exits from buildings are maintained while facilities remain in use. Temporary fencing with green windscreen shall be erected by the contractor to segregate work areas from all other campus areas.

D Contractor shall commence performance of the Contract upon the date specified in the Notice to Proceed and shall furnish sufficient labor, equipment, material, extra shifts and overtime to achieve the required milestones as indicated on Section 01010.

2.6 Allowances

The bidders shall include within the base bid the following allowances. The allowances shall be identified as separate line items in the Contractor’s schedule of values. The allowances are to be used at the College’s sole discretion for work not otherwise shown and/or specified in the construction documents. Work performed under the allowances shall be performed only as directed in writing by Program Management Team, through the Construction Manager. Any and all unused allowance amounts shall be credited to the College by change order and reflected in the Contractor’s final application for payment without any compensation for overhead and profit.

EXHIBIT I – ALLOWANCES

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<tr>
<td></td>
<td>Total</td>
<td>$35,000</td>
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2.7 Ancillary Project Conditions
Contractor shall provide an itemized scope and work plan to include field notes and shop drawings to accomplish each of the ancillary projects listed on Exhibit I above. Estimates of costs must be provided prior to commencement of work. The work will be tracked on a time and materials basis.

Owner reserves the option to assign work to others with a Not to Exceed amount of 1% of contract value and at no more than 5% overhead and profit markup on assigned subcontractor. Any allowances not used can be assigned to other allowances or deleted in this contract at no penalty to the College.

2.8 Coordination with other Onsite contractors/trades

A. Contractor shall coordinate operations included in various sections of the Contract Documents to help ensure efficient and orderly completion of the work.

B. Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and help ensure orderly progress of the work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of schedules.
   2. Installation, relocation and removal of temporary facilities.
   3. Progress meetings.
   4. Project coordination activities.

C. Coordinate all work with other onsite contractors.

2.9 Protection of Persons and Property

A. The Contractor shall be responsible for all damages to persons or property that occur as a result of its fault or negligence in connection with the prosecution of this Contract and shall take all necessary measures and be responsible for the proper care and protection of all materials delivered to and from the site and work performed until completion and final acceptance by the College. All work shall be solely at the Contractor's risk, with the exception of damage to the work caused by "acts of God" as defined in Public Contract Code Section 7105(b)(2).

B. Contractor shall take, and require all subcontractors to take, all necessary precautions for the safety of workers on the site and shall comply with all applicable federal, state, local and other safety laws, standards, orders, rules, regulations, and building codes to prevent accidents or injury to persons on, about, or adjacent to premises where Work is being performed and to provide a safe and healthful place of employment. In addition to meeting all requirements of OSHA, Cal-OSHA, state, and local codes. Contractor shall furnish, erect and properly maintain at all times, as directed by the College or Program Manager or required by conditions and progress of work, all necessary safety devices, safeguards, construction canopies, signs, audible devices for protection of the blind, safety rails, belts and nets, barriers, lights, and watchmen for protection of workers and the public, and shall post danger signs warning against hazards created by such features in the course of construction.

C. The Contractor shall erect and maintain, as required by existing conditions and performance
of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent sites and utilities.

D. Requirements for Existing Sites.

Contractor shall (unless waived by the College in writing):

(a) When performing construction on existing sites, become informed and take into specific account the maturity of the students on the site. Contractor shall perform Work which may interfere with school routine before or after school hours, enclose working area with a substantial barricade, and arrange Work to cause a minimum amount of inconvenience and danger to students and faculty in their regular school activities. The Contractor shall comply with specifications and directives of the College regarding the timing of certain construction activities in order to avoid unnecessary interference with school functioning.

(b) Provide substantial barricades around any shrubs or trees indicated to be preserved.

(c) Deliver materials to building area over route designated by the College through the Construction Manager.

(d) Take preventive measures to minimize objectionable dust, noise, or other disturbances.

(e) Take preventive measures to prevent disturbing or covering any survey markers, monuments or other devices marking property boundaries or corners. If such markers are disturbed by accident, they shall be replaced by an approved land surveyor or civil engineer and all maps and records required therefrom shall be filed with the County and local authorities, at no cost to the College. All filing and plan check fees shall be paid by Contractor.

(f) Provide to the College on request, the Contractor's written safety program and safety plan for each site.

E. Covering and Cleaning: Cover and protect the College's property within the project limits, as required to prevent soiling or damage by dust, dirt, water, fumes, or otherwise as deemed necessary by the College or Program Manager.

F. Repair or replace any damage to existing structures, improvements and equipment caused by Contractor's operations, at Contractor's expense.

G. Repair or replace damaged work with new materials, to restore the damaged areas and surfaces equal to and matching, the conditions which existed prior to damage, or at start of the work of this Contract, at no cost to the College.

H. Prior to start of work, Contractor, College and Construction Manager shall conduct an on-site inspection of existing conditions and the Contractor shall clearly document and report damaged conditions to the College. Items not reported to the College at time of inspection will be assumed to be result of Contractor's work, whose responsibility it will be to repair or replace those items. Contractors shall include, along with his report to the College, digital, dated photographs.
2.10 Power Shut-down Requirements

A. In addition to any items identified in the Contract Documents, the Contractor shall provide the following in the event of any unforeseen disruption of electrical service on campus.

1. Provide a detailed sequence of events identifying activities for the scope of work, including durations and manpower for the scope of work. The Contractor shall provide this sequence of events 2 weeks prior to commencement of this scheduled work.

2. Provide any temporary power required to keep critical facilities operational. Such items include but are not limited to computer servers, Fire Life Safety, Server room AC, irrigation controllers, pool pumps, security panels, freezers/coolers etc.; at no cost to the College.

3. If the Contractor disrupts Fire Alarm to any of the existing buildings at not additional cost the Contractor will provide a minimum of one (1) fire watch to patrol areas that are not on an active fire alarm system.

END OF SECTION
PART 1 - GENERAL

1.01 SECTION INCLUDES
   A. List of abbreviations, symbols, and acronyms of societies, institutes, and associations generally appearing in the Contract Documents.

1.02 RELATED SECTIONS
   A. Division 01: General Requirements

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.01 ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
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<td>ac</td>
<td>Alternating current</td>
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<td>amp</td>
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<tr>
<td>BTU</td>
<td>British thermal unit</td>
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<tr>
<td>cfh</td>
<td>Cubic feet per hour</td>
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<tr>
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<td>Centimeter</td>
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<td>Company</td>
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<tr>
<td>COP</td>
<td>Coefficient of performance</td>
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<td>Penny</td>
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<td>db.</td>
<td>Decibel</td>
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<td>DB</td>
<td>Dry bulb</td>
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<td>Direct current</td>
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<tr>
<td>EER</td>
<td>Energy efficiency ratio</td>
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<td>F</td>
<td>Degrees Fahrenheit</td>
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<td>fpm</td>
<td>Feet per minute</td>
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<tr>
<td>gph</td>
<td>Gallons per hour</td>
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<tr>
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<td>Gallons per minute</td>
</tr>
<tr>
<td>HP</td>
<td>Horsepower</td>
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<td>HVAC</td>
<td>Heating, ventilating and air conditioning</td>
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<td>LED</td>
<td>Light emitting diode</td>
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<tr>
<td>MBH</td>
<td>1000 BTUs per hour</td>
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1000 BTUs per hour
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<tr>
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<tr>
<td>MHz</td>
<td>Mega hertz</td>
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<tr>
<td>mil</td>
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<td>Acidity-alkalinity balance</td>
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<tr>
<td>psig</td>
<td>Pounds per square inch, gage</td>
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<td>SY</td>
<td>Square yard</td>
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<td>V Volt</td>
<td>Wet bulb</td>
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3.03 ACRONYMS

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<td>The Aluminum Association, Inc</td>
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<td>AABC</td>
<td>Associated Air Balance Council</td>
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<tr>
<td>AAMA</td>
<td>American Architectural Manufacturers Association</td>
</tr>
<tr>
<td>AASHTO</td>
<td>American Association of State Highway and Transportation Officials</td>
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<tr>
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<tr>
<td>ABMA</td>
<td>American Boiler Manufacturers Association</td>
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<td>ACI</td>
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<tr>
<td>ADA</td>
<td>Americans with Disabilities Act</td>
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<td>ADAAG</td>
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<tr>
<td>AGA</td>
<td>American Gas Association</td>
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<tr>
<td>AGCIH</td>
<td>American Conference of Governmental Industrial Hygienists</td>
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<td>Asphalt Institute</td>
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<tr>
<td>AIA</td>
<td>American Institute of Architects</td>
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<tr>
<td>AISC</td>
<td>American Institute of Steel Construction</td>
</tr>
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<td>AISI</td>
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<tr>
<td>AITC</td>
<td>American Institute of Timber Construction</td>
</tr>
<tr>
<td>AMCA</td>
<td>Air Movement and Control Association, Inc.</td>
</tr>
<tr>
<td>ANSI</td>
<td>American National Standards Institute</td>
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<tr>
<td>APA</td>
<td>APA – The Engineered Wood Association</td>
</tr>
<tr>
<td>ARI</td>
<td>Air-Conditioning and Refrigeration Institute</td>
</tr>
<tr>
<td>ASHRAE</td>
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</tr>
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<td>American Society of Mechanical Engineers</td>
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<tr>
<td>ASTM</td>
<td>American Society for Testing and Materials</td>
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<tr>
<td>ATBCB</td>
<td>Architectural &amp; Transportation Barriers Compliance Board</td>
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<td>AWI</td>
<td>Architectural Woodwork Institute</td>
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<tr>
<td>AWPA</td>
<td>American Wood Preservers Association</td>
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<td>AWPI</td>
<td>American Wood Preservers Institute</td>
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<td>American Water Works Association</td>
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<td>Builders Hardware Manufacturers Association</td>
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<td>Brick Institute of America</td>
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<td>Description</td>
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<td>California Occupational Safety and Health Administration</td>
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<td>Concrete Reinforcing Steel Institute</td>
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<tr>
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<tr>
<td>CSI</td>
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<td>Ceramic Tile Institute of America</td>
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<td>Cooling Tower Institute</td>
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<tr>
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<td>Door and Hardware Institute</td>
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<tr>
<td>DSA</td>
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<tr>
<td>EPA</td>
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<tr>
<td>ETL</td>
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<td>FCC</td>
<td>Federal Communication Commission</td>
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<td>FM</td>
<td>Factory Mutual</td>
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<td>Gypsum Association</td>
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<td>Glass Association of North America</td>
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<td>HMMA</td>
<td>Hollow Metal Manufacturer’s Association</td>
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<td>HPVA</td>
<td>Hardwood Plywood &amp; Veneer Association</td>
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<td>IACS</td>
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</tr>
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<td>ICBO</td>
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<tr>
<td>ICEA</td>
<td>Insulated Cable Engineers Association</td>
</tr>
<tr>
<td>IEEE</td>
<td>Institute of Electrical &amp; Electronic Engineers, Inc.</td>
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<td>Industrial Risk Insurers</td>
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<td>MLSFA</td>
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<td>Manufacturers Standardization Society of the Valve &amp; Fittings Industry</td>
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<td>NFPF</td>
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<td>NIOSH</td>
<td>National Institute for Occupational Safety and Health</td>
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<td>National Institute of Standards and Technology</td>
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<td>NPCA</td>
<td>National Paint and Coatings Association</td>
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<td>NPDES</td>
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<td>Abbreviation</td>
<td>Name</td>
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<tr>
<td>--------------</td>
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<tr>
<td>NRCA</td>
<td>National Roofing Contractors Association</td>
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<tr>
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<td>National Terrazzo &amp; Mosaic Association</td>
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<tr>
<td>NUSIG</td>
<td>National Uniform Seismic Installation Guidelines</td>
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<td>NWMA</td>
<td>National Woodwork Manufacturers Association</td>
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<tr>
<td>OEHS</td>
<td>Office of Environmental Health and Safety (LAUSD’s)</td>
</tr>
<tr>
<td>PCA</td>
<td>Portland Cement Association</td>
</tr>
<tr>
<td>PCI</td>
<td>Precast/Prestressed Concrete Institute</td>
</tr>
<tr>
<td>PDI</td>
<td>Plumbing and Drainage Institute</td>
</tr>
<tr>
<td>PEI</td>
<td>Porcelain Enamel Institute</td>
</tr>
<tr>
<td>PS</td>
<td>Product Standard, U.S. Department of Commerce</td>
</tr>
<tr>
<td>RIS</td>
<td>Redwood Inspection Service</td>
</tr>
<tr>
<td>RFCI</td>
<td>Resilient Floor Covering Institute</td>
</tr>
<tr>
<td>SCAQMD</td>
<td>South Coast Air Quality Management District</td>
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<tr>
<td>SDEI</td>
<td>Steel Deck Institute</td>
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<td>SDI</td>
<td>Steel Door Institute</td>
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<td>SFM</td>
<td>State Fire Marshal</td>
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<td>SFPA</td>
<td>Southern Forest Products Association</td>
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<td>SIGMA</td>
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<td>Steel Joist Institute</td>
</tr>
<tr>
<td>SMACNA</td>
<td>Sheet Metal and Air Conditioning Contractors National Association</td>
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<tr>
<td>SSPC</td>
<td>Steel Structures Painting Council</td>
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<tr>
<td>SWI</td>
<td>Steel Window Institute</td>
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<tr>
<td>TCA</td>
<td>Tile Council of America</td>
</tr>
<tr>
<td>UBPPA</td>
<td>Uni-Bell PVC Pipe Association</td>
</tr>
<tr>
<td>UCI</td>
<td>Uniform Construction Index</td>
</tr>
<tr>
<td>UFAS</td>
<td>Uniform Federal Accessibility Standards</td>
</tr>
<tr>
<td>UL</td>
<td>Underwriters’ Laboratories, Inc.</td>
</tr>
<tr>
<td>WCLIB</td>
<td>West Coast Lumber Inspection Bureau</td>
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<tr>
<td>WDMA</td>
<td>Window and Door Manufacturers Association</td>
</tr>
<tr>
<td>WIC</td>
<td>Woodwork Institute of California</td>
</tr>
<tr>
<td>WWPA</td>
<td>Western Wood Products Association</td>
</tr>
</tbody>
</table>

END OF SECTION
SECTION 01010
PHASING OF THE WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES
A. Requirements
   a. Comply with the requirements of Section 0800-2.5.

1.02 RELATED SECTIONS
A. Section 01010: Phasing of Work – APPENDIX A – MILESTONES
B. Section 01100: Summary of Work
C. Section 01040: Project Coordination
D. Section 01330: Submittal Procedures
E. Section 01320: Construction Progress Documentation
F. Section 01500: Construction Facilities and Temporary Controls
G. Section 01770: Closeout Procedures

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 SUBMITTALS
A. CONTRACTOR shall submit a Project site logistics plans in accordance with the requirements of this Section.

3.02 LOGISTICS
A. Prior to the issuance of NTP -1, CONTRACTOR shall prepare and submit to Construction Manager, a detailed Project site logistic plan, in same size and scale of Drawings, setting forth CONTRACTOR plan of Work relative to the following items:
   1. Haul route in accordance with local ordinances to and from Project site:
   2. Identification of any overhead wire restrictions for power, street lighting, telecommunications or cable;
   3. Local sidewalk access and street closure requirements;
   4. Protection of sidewalk pedestrians and vehicular traffic;
   5. Project site fencing and access gate locations;
6. Construction parking;
7. Material staging or delivery areas;
8. Material storage areas;
9. Temporary trailer(s) locations;
10. Temporary service location and proposed routing of all temporary utilities;
11. Trash removal and location of dumpsters;
12. Concrete pumping locations;
13. Crane locations;
14. Location of portable sanitary facilities;
15. Concrete mixer truck washout locations;
16. Traffic control signage;
17. Perimeter and site lighting;
18. Storm Water Pollution Prevention Plan – SWPPP;
19. Stockpile or lay down areas;

B. Revised Project site logistic plan may be required by Construction Manager for separately identified phases and segments of Work as set forth in this Section.

C. CONTRACTOR is responsible for securing and/or obtaining all approvals and permits from authorities having jurisdiction over the work.

3.03 PHASING OF THE WORK – GENERAL

A. CONTRACTOR shall prepare Construction Schedule in order to complete Work and related activities in accordance with phasing plan as established in Appendix “APPENDIX A – MILESTONES”. CONTRACTOR shall include all costs to complete all Work within Milestones or Contract Time.

B. OWNER will be seriously damaged by not having all Work completed within Milestones or Contract Time. It is mandatory Work be complete within Milestones or Contract Time.

C. The major phases/segments of the work are identified below and shall be followed with the following general guidelines.

Phase 1 – Mobilization and issuance of NTP:

Work to start immediately following issue of initial Notice to Proceed “NTP I”. See Milestones 1, 2, 3 and 4; and requirements of Section 01500 and other
related Sections. Notice to Proceed “NTP II” shall follow the successful completion of Phase I requirements.

**Phase 2 – Construction to Substantial Completion:**

Milestones 5, 6. Construction to start following issuance of NTP Phase 2 is defined as completion of milestones 5, 6, 7. All work to be substantially complete as defined by Article 7.2.2 of General Conditions.

**Phase 3 - Administrative Closeout:**

Work includes substantial completion of the overall project and final completion of Work in accordance with Articles 7.2.2 and 7.2.4 of the General conditions, respectively.

3.05 **PHASING OF THE WORK – SPECIFIC**

A. CONTRACTOR shall prepare Construction Schedule, and shall the complete following Milestones as shown in Section 01010 – Appendix A:

1. Phase 1: **Mobilization** – (10) calendar days: Milestones 1
2. Phase 2: **Construction** – (64) calendar days: Milestones 2
3. Phase 3: **Administrative Closeout** – (15) calendar days: Milestones 3

B. The Contract Time shall be a total of (79) calendar days from date of commencement of Contract Time.

END OF SECTION
CONTRACTOR shall commence performance of the Contract upon the date specified in the Notice to Proceed and shall furnish sufficient forces, facilities and materials, work such hours, including extra shifts and overtime operations, so as to fully perform the Work in accordance with the following Milestones.

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Description</th>
<th>Schedule</th>
<th>Liquidated Damages Per Calendar Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1</td>
<td>Phase 1 – Mobilization: Notice to Proceed– NTP: Is established in accordance with Articles 7.1 and 7.2.2 of the General Conditions.</td>
<td>Start date per NTP</td>
<td></td>
</tr>
<tr>
<td>No.2</td>
<td>Critical Shop Drawings &amp; Submittals Complete: Is defined as CONTRACTOR prepared Shop Drawings and Submittals that are either critical or near critical to the overall Substantial Completion of the Project. Milestones may include, but not be limited to, Baseline Schedule per Article 7.3, schedule of values per Article 8.2, DSA Deferred Approvals, Steel and Shoring Drawings, Concrete and Piling Approvals, excavation support system drawings, seismic calculations if any, shoring system drawings, or any long lead fabrication/procurement item requiring Shop Drawings.</td>
<td>10 calendar days after the effective date of the NTP</td>
<td></td>
</tr>
<tr>
<td>No. 3</td>
<td>Baseline Schedule Submitted: Is defined as baseline schedule in compliance with all the requirements outlined in Article 7.3 and in Division 01 Sections 01320 and 01010 is completed and submitted for CM review and approval.</td>
<td>10 Calendar days after the effective date of the NTP-1</td>
<td></td>
</tr>
<tr>
<td>No. 4</td>
<td>Completion of Mobilization activities: Is defined as CONTRACTOR mobilization completed, all submittals approved and lead-time items processed for procurement, logistics plan submitted and approved (access, gates, parking, trailer locations, signage), site fencing completed if needed, temporary utilities connections completed (water, electric, phone, sanitation, fire protection), Project signage completed, submit for and obtain all required permits, implementation of Storm Water Pollution Prevention measures, submission of CONTRACTOR Safety , submission of CONTRACTOR Hazard Communication Plan, and obtain approval ACM submittal</td>
<td>10 calendar days after the effective date of the NTP</td>
<td>$100.00</td>
</tr>
</tbody>
</table>

* Milestone date to be determined by CONTRACTOR during development of the Construction Schedule and submitted to the CM for approval.

RIO HONDO COMMUNITY COLLEGE
FITNESS CENTER MECHANICAL PROJECT

-PHASING OF THE WORK - APPENDIX A
<table>
<thead>
<tr>
<th>Milestone</th>
<th>Description</th>
<th>Schedule</th>
<th>Liquidated Damages Per Calendar Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 5</td>
<td><strong>Phase 2– Construction:</strong> Total of 79 Calendar days following Mobilization. Start of Phase 2 Construction, as defined on Item 3.05.A.2 of this Section, stating Architect and CM approved date to start actual demolition and construction activities. Work completion shall be defined as all work is substantially completed including but not limited to, installation of all tie backs and concrete wall system, drainage, backfill, compaction, landscaping and irrigation, final testing and inspection etc.</td>
<td>79 Calendar days after the effective date of NTP</td>
<td></td>
</tr>
<tr>
<td>No. 6</td>
<td><strong>Substantial Completion for Total Contract work:</strong> Is established in accordance with Article 7.2.2 of the General Conditions.</td>
<td>64 Calendar days after the effective date of the NTP</td>
<td>$2000.00</td>
</tr>
<tr>
<td>No. 7</td>
<td><strong>Close out and Final Completion:</strong> Is established in accordance with Article 7.2.4 of the General Conditions.</td>
<td>79 Calendar days after the effective date of the NTP</td>
<td>$1,000.00</td>
</tr>
</tbody>
</table>

* Milestone date to be determined by CONTRACTOR during development of the Construction Schedule and submitted to the CM for approval.

RIO HONDO COMMUNITY COLLEGE
FITNESS CENTER MECHANICAL PROJECT

-PHASING OF THE WORK - APPENDIX A-
PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The following, but not limited to, administrative forms and documents listed in this Section are to be utilized in the administration of the Work. Upon request by CONTRACTOR, Construction Manager may approve the use of alternate forms. One disc containing electronic files, listed hereafter, of Project Forms will be delivered to CONTRACTOR during the pre-construction meeting.

B. From time to time, OWNER may release new revisions and/or new Project Forms. At any time during the Project, if requested by College thru the Construction Manager, CONTRACTOR shall use the new released Project Forms.

1.02 Related DOCUMENTS

A. Division 01: General Requirements

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 FORMS

A. The following examples of forms are contained within this Section:

1. Request for Information
2. Application for Payment (2 pages)
3. Request for Proposal
4. Request for Allowance Disbursement
5. Utility Shutdown and Start-up Request (2 pages)
6. Record of Negotiation
7. Justification for Contract Modification
8. Change Order Proposal Detail Sheets (3 pages)
9. Change Order
10. Construction Change Directive
11. College Construction Procedures Memorandum
12. Contractor’s Inspection Request / Result

3.02 PROCEDURES

A. Request for Information: This form is used to request additional information regarding any elements of the contract documents.

B. Application for Payment: This form is used in requesting a progress payment.

C. Request for Proposal: This form is used to request a proposed adjustment in the Contract Amount, Milestones or Contract Time in response to the Work contained within the Request for Proposal.

D. Allowance Disbursement Authorization: This form is used for the request and approval of Contract allowances.

E. Utility Shutdown Request: This form is to be submitted two weeks prior to any utility shutdown or start-up.

F. Record of Negotiations: This form is used to document any additional cost negotiations.

G. Justification for Contract Modification: This form is used to document any change order exceeding ten percent (10%), but not exceeding twenty-five percent (25%) of the original contract amount.

H. Change Order Proposal: This form is used to communicate proposed adjustments to the Contract Amount, Milestones or Contract Time.

I. Change Order: This form is used to adjust the Contract Amount, Milestones or Contract Time.

J. Construction Change Directive

K. College Construction Procedures Memorandum: This document contains additional College construction activity protocols. College reserves the right to change or update activity protocols at any time.

END OF SECTION
CHANGE ORDER (CO)

School Name: ___________________________  CO Initiate Date: ___________________________
Project Name: ___________________________  Field CO Number: ___________________________
Project Description: ___________________________  Project Number: ___________________________
To (Contractor): ___________________________  Contract Number: ___________________________

<table>
<thead>
<tr>
<th>Project CO #</th>
<th>Contract CO #</th>
<th>% Total COs to Original Contract</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td></td>
<td>$0.00</td>
</tr>
<tr>
<td>F</td>
<td></td>
<td>$0.00</td>
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<tr>
<td>G</td>
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</tbody>
</table>

You are hereby directed to make the following change(s) in the Contract.

Description of Work / Reason for Change

Reason for change:  
Architect Deficiency  
Unforeseen Condition  
Owner Request

Contract Documents associated with this Change Order are as follows:

The Contract Amount due to this Change Order will be: $0.00
The Contract Time due to this Change Order: N/A

Contract Milestone(s) have been changed as per the attached Schedule

The revised Final Completion date is N/A

Remaining disputed portion of the Change Order Proposal

Contractor believes that the value for the work described herein is $_______ and ________ day(s) in excess of the Contract adjustments in this Change Order.

In accordance with GC Sections 10 and 16, the Contractor is required to file claim for disputed amount by (date): (10 days from date CO issued to Contractor)

Contractor must sign and return this Change Order by (date): (10 days from date CO issued to Contractor; General Conditions, Article 10.14)

Should the Contractor fail to sign and return this Change Order as required, Owner reserves the right to process the Change Order without the Contractor's signature

By signing this Change Order, the parties agree the adjustments to the Contract shown herein are full and final. However, the parties do not waive any rights or defenses regarding disputed amounts of money or time listed on this document. Refer to the dispute resolution provisions of the Contract for further action.

<table>
<thead>
<tr>
<th>Signature</th>
<th>Name (Print)</th>
<th>Date</th>
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<tbody>
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</tbody>
</table>

Change Order Item Code: ___________________________  Owner's Authorized Rep. Initials: ___________________________
State of California - Division of the State Architect, Application Number: ___________________________
N/A  DSA File Number: ___________________________

CC: ___________________________

Change Order
**CHANGE ORDER REQUEST (COR)**

School Name: Rio Hondo College  
COR Number:  
Project Name:  
Project Number:  
To: (CM Firm)  
Date Generated:  
From: (Contractor)  
Contract Number:  

**Description of Work:**  
Reference RFI No.  
RFP No.  

<table>
<thead>
<tr>
<th>Reason for Change</th>
<th>GC Extra</th>
<th>Sub Extra</th>
<th>CREDIT</th>
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</thead>
<tbody>
<tr>
<td>A. Material</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>B. Labor</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>C. Equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Subtotal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. If Subcontractors performed Work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Subtotal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. From line F, the General Contractor's overhead and profit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. Subtotal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I. Bond not to exceed (1%) of item I.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J. Total</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- $ -

**The proposal would affect the Milestones and/or Contract Time by ** calendar days.  
**The proposal does NOT affect the Milestones and/or Contract Time.**

---

Contractor: ___________________________  
Signature: ___________________________  
Date: ___________________________

Architect of Record: ___________________________  
Signature: ___________________________  
Date: ___________________________

Construction Manager: ___________________________  
Signature: ___________________________  
Date: ___________________________

Program Manager: ___________________________  
Signature: ___________________________  
Date: ___________________________

Owner Authorized Representative: ___________________________  
Signature: ___________________________  
Date: ___________________________
CONSTRUCTION CHANGE DIRECTIVE

You are hereby directed to provide the additional work necessary to comply with this Construction Change Directive.

Description of Change:

NOTE:

Contractor is directed to furnish all labor and materials and perform all of the above described work in accordance with terms and compliance with the applicable sections of the Contract Documents. The amount of $ under this Construction Change Directive is limited to the charges allowed under Article 7 of the Contract Documents. The adjustment in the contract sum, if any, and the adjustment in the contract, if any, set forth in this Construction Change Directive shall constitute the entire compensation and/or adjustment in the contract sum due to the Contractor arising from the change in work covered in this Construction Change Directive otherwise provided in this Construction Change Directive.
CONTRACTOR'S INSPECTION REQUEST/RESULT

School Name: ______________________  Date Generated: ______________________
Project Name: ____________________  Project Description: ____________________
Issued To: ________________________  Project Number: ________________________
Subject: __________________________  Contract Number: ______________________

We are requesting inspection for work:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Building / Location: ________________________________________________________

Date of Requested Inspection: ______________________________________________

Contractor's Authorized Representative: ______________________________________

Print Name: ______________________  Signature: _________________________________

The request was received by the Project Inspector on ____________________________

Day Date Time

Inspection performed by Inspector on: __________________________________________

Day Date Time

Inspector's Comments:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Corrections/Re-inspection Required:  ____Yes  ____ No

Inspector: ________________________________________________________________

Signature: _________________________________________________________________

cc: ________________________________________________________________
JUSTIFICATION FOR CONTRACT MODIFICATION

School Name: ______________________  Date: ______________________
Project Name: ____________________  Project Number: ________________
Project Description: ________________  Contract Number: _____________
Contractor Firm: ________________  CO / Claim no.: ___________________

JUSTIFICATION FOR CHANGE:

For contracts involving demolition, reconstruction or rehabilitation work of existing structures:
For individual Change Orders exceeding ten percent (10%), but not exceeding twenty-five percent (25%) of the original contract amount, justification must confirm that the change is a necessary and integral part of the work under the original contract and the taking of bids would delay the completion of the contract.

JUSTIFICATION FOR TIME:

RECORD OF NEGOTIATION SUMMARY:

# of Meetings: ______  Location of Meetings: PMT Trailer HS-6, 3600 Workman Mill Road, Whittier, CA

Contractor Representatives (Name & Title): ______________________  Owner Representatives (Name & Title): ______________________

NEGOTIATION SUMMARY: (Note: Document key discussion points & note changes in Contractor proposal - attach additional sheets as necessary)

Owner Estimate: ________________  Negotiations Concluded on: ________________
Contractor Proposal: ________________  Revised Final Completion date: ________________
Final Price Agreed to: ________________  Net Adjustment in Contract Time: ________________

☐ There is a disputed amount on this Change Order and it is being processed for the District's Fair Cost Estimate (see Change Order form for details)

☐ Labor Rates for this Change Work are higher than the burdened Prevailing Wage Rate. The associated Labor Rate Sheets and supporting documentation are enclosed for Construction Manager review and approval per Change Order policies

I certify that the information documented herein is a true and accurate account of contract negotiations for the contract referenced above between Rio Hondo Community College District and the Contractor.

______________________________  ____________________  _____________
Construction Manager Signature  Construction Manager  Date
## APPLICATION FOR PAYMENT

<table>
<thead>
<tr>
<th>Contractor:</th>
<th>Application No: 1</th>
<th>Contract Number:</th>
<th>Notice to Proceed Date:</th>
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<tbody>
<tr>
<td>Address:</td>
<td></td>
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</table>

### Project Name:

<table>
<thead>
<tr>
<th>Estimate Cutoff Date: From:</th>
<th>To:</th>
</tr>
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### Change Orders

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>DESCRIPTION OF ITEM</th>
<th>SUBCONTRACTOR/ SUPPLIER</th>
<th>SCHEDULED VALUE</th>
<th>FROM PREVIOUS APPLICATION (D + E)</th>
<th>THIS PERIOD</th>
<th>MATERIALS PRESENTLY STORED (NOT IN D OR E)</th>
<th>TOTAL COMPLETED AND STORED TO DATE (D+E+F)</th>
<th>% (G/C)</th>
<th>BALANCE TO FINISH (C-G)</th>
<th>RETAINAGE (IF VARIABLE RATE)</th>
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### Total Change Orders:

### Payment Application Summary

<table>
<thead>
<tr>
<th>BASE BID SUBTOTAL</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CHANGE ORDER TOTALS</td>
<td></td>
</tr>
<tr>
<td>TOTAL GROSS AMOUNT COMPLETED TO DATE:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Retention/Security</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL THIS APPLICATION</td>
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</table>
SECTION 1: CONTRACTOR'S APPLICATION FOR PAYMENT

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>01. ORIGINAL CONTRACT SUM</td>
<td>$0</td>
</tr>
<tr>
<td>02. Net change by Change Order</td>
<td>$0</td>
</tr>
<tr>
<td>03. CONTRACT SUM TO DATE (Line 1+-2)</td>
<td>$0</td>
</tr>
<tr>
<td>04. TOTAL COMPLETED &amp; STORED TO DATE</td>
<td>$0</td>
</tr>
<tr>
<td>05. RETAINAGE</td>
<td></td>
</tr>
<tr>
<td>a. 10% of Completed Work:</td>
<td>$0</td>
</tr>
<tr>
<td>b. 10% of Stored Material:</td>
<td>$0</td>
</tr>
<tr>
<td>TOTAL RETAINAGE</td>
<td>$0</td>
</tr>
<tr>
<td>06. TOTAL EARNED LESS RETAINAGE</td>
<td>$0</td>
</tr>
<tr>
<td>(Line 4 less Line 5 Total)</td>
<td></td>
</tr>
<tr>
<td>07. LESS PREVIOUS CERTIFICATES FOR PAYMENT</td>
<td>$0</td>
</tr>
<tr>
<td>(Line 6 from prior Application for Payment)</td>
<td></td>
</tr>
<tr>
<td>08. CURRENT PAYMENT DUE (Line 6 less Line 7)</td>
<td>$0</td>
</tr>
<tr>
<td>09. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6)</td>
<td>$0</td>
</tr>
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</table>

CHANGE ORDER SUMMARY

<table>
<thead>
<tr>
<th>Description</th>
<th>ADDITIONS</th>
<th>DEDUCTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total changes approved in previous months by owner</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total approved this month</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTALS</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

10. Certification:
Under penalty of perjury under the Laws of California, I certify that all items, units, quantities, and prices for work shown on this payment request are correct; that all Work has been performed and materials supplied in full accordance with the terms and conditions of the construction contract on this project; that all of the information set forth herein or attached hereto is a true and correct statement of the Contract Amount and the Contract Time up to and including the last day of the period covered by this invoice, and that on part of the "Current Payment Due" has been received.

Contractor: [Name]
Contractor's Signature: [Signature]
Name (Print): [Name (Print)]
Date: [Date]

SECTION 2: APPROVALS

11. Architect:
Signature: [Signature]
Name (Print): [Name (Print)]
Date: [Date]

12. Inspector of Record:
Signature: [Signature]
Name (Print): [Name (Print)]
Date: [Date]

13. Construction Manager:
Signature: [Signature]
Name (Print): [Name (Print)]
Date: [Date]

14. Program Manager:
Signature: [Signature]
Name (Print): [Name (Print)]
Date: [Date]

15. Assistant Director of Facility S
Signature: [Signature]
Name (Print): [Name (Print)]
Date: [Date]

16. Vice President of Finance and
Signature: [Signature]
Name (Print): [Name (Print)]
Date: [Date]
RECORD OF NEGOTIATION

School Name: ___________________________ Date: ___________________________
Project Name: ___________________________ Project Number: ___________________________
Project Description: ___________________________ Contract Number: ___________________________
CO / Claim no.: ___________________________

Meeting No.: _______ Location: ___________________________ Meeting Time: ____________

Contractor Representatives (Name & Title): ___________________________
Owner Representatives (Name & Title): ___________________________

NEGOTIATION SUMMARY: (Note: Document key discussion points & note changes in Contractor proposal)

NEGOTIATION SUMMARY: (Note: Document key discussion points & note changes in Contractor proposal)

Estimate: ___________________________ Negotiations Concluded on: ___________________________
Proposal: ___________________________ Revised FINAL COMPLETION: ___________________________
Final Price Agreed to: ___________________________ Adjustment in Contract Time: ___________________________
(Attach justification)

ADDITIONAL COMMENTS:

I certify that the information documented herein is a true and accurate account of contract negotiations for the contract referenced above between Rio Hondo Community College District and the Contractor.

______________________________  ___________________________  __________
Construction Manager (CM)          CM Signature                      Date

Revised October 10, 2006
REQUEST FOR ALLOWANCE

Bid No. | Project: |
--------|----------|
Contractor: | CM: |
Contract Amount: | Allowance No.: | ALL |

DESCRIPTION:
ALL

<table>
<thead>
<tr>
<th>Item</th>
<th>Allowance Amount</th>
<th>Previous Amount</th>
<th>Current Amount</th>
<th>Remaining Balance</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
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<td></td>
<td></td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td></td>
</tr>
</tbody>
</table>

TOTAL ALLOWANCE | $0.00 | $0.00 | $0.00 | $0.00 |

Previous Allowance Amount | $0.00 |
Current Allowance Amount | $0.00 |
Total Allowance | $0.00 |
Allowance Balance | $0.00 |

Contractor Name

Construction Management, Inc.
Program Manager

Assistant Director of Facility Services
Finance and Business
REQUEST FOR INFORMATION (RFI)

School Name: ___________________________ RFI Number: ___________________________
Project Name: ___________________________ Date Generated: ___________________________
Project Description: _____________________ Project Number: ___________________________
Issued To: _______________________________ Contract Number: _________________________
Subject: _________________________________

<table>
<thead>
<tr>
<th>Drawing Number Detail</th>
<th>Specification Section</th>
<th>Page</th>
</tr>
</thead>
</table>

Request: (Include a proposed solution where applicable)

Request Issued by: ___________________________
Contractor’s Signature Name (Printed) Date

Response:

Response Issued by: ___________________________
Architect’s Signature Name (Printed) Date

This Form Cannot Modify Contract Amount or Milestones and/or Contract Time.
REQUEST FOR PROPOSAL (RFP)

School Name: Rio Hondo College

Project Name: 

Issued To: (Contractor)

RFP Number: 

Date: 

Project No.: Bid #

Contract No.: Bid #

Please submit an itemized quotation for adjustments, if any, in the Contract Amount, Milestones and/or Contract Time reflecting the proposed Work described herein. The itemized quotation must be submitted within the time frames as specified by the OAR after the receipt of this Request for Proposal (RFP).

THIS IS NOT A CHANGE ORDER OR A DIRECTION TO PROCEED WITH THE WORK DESCRIBED HEREIN.

Description of Work

Attachments

Issued by: 

Construction Manager 

Date 

Change Order Proposal is due from the Contractor by:

Date 

Construction Manager 

Name (Printed) 

Date 

cc:

Revised May 19, 2003
**Utility Shutdown Request**

**Utilities to be Shutdown**

- [ ] HVAC
- [ ] Irrigation
- [ ] Fire Sprinklers
- [ ] HVAC
- [ ] Fire Alarms
- [ ] Elevators
- [ ] Electricity
- [ ] Gas
- [ ] Domestic Water
- [ ] Other

<table>
<thead>
<tr>
<th>Building Affected</th>
<th>Floors and Rooms Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ] Whole Building</td>
<td>[ ] Whole Building</td>
</tr>
<tr>
<td>[ ] Whole Building</td>
<td>[ ] Whole Building</td>
</tr>
<tr>
<td>[ ] Whole Building</td>
<td>[ ] Whole Building</td>
</tr>
</tbody>
</table>

**Shutdown Date and Time**

1<sup>st</sup> Choice  
Date:__________  
Start Time:_______  
End Time:________

2<sup>nd</sup> Choice  
Date:__________  
Start Time:_______  
End Time:________

**Purpose of Shutdown**

_____________________________________________________________________________

_____________________________________________________________________________

Work Order No.:____________________

Requestor Name:___________________________________________  
Ext.:____________
(RHPMT)  
(please print)

Signature:__________________________________________  
Date:__________

**APPROVALS**

Assistant Director:________________________  
Date:________________________

Director:______________________________  
Date:______________________________

**Notes:**

- Gas and domestic water shutdowns may require outside agency coordination.
- In general, two weeks advance notice of utility shutdown is required for most utilities and four weeks for high voltage shutdowns.
Notes:

- Gas and domestic water shutdowns may require outside agency coordination.
- In general, two weeks advance notice of utility shutdown is required for most utilities and four weeks for high voltage shutdowns.
SECTION 01050
SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Procedure for submission of a certified Schedule of Values for review and approval by the Construction Manager.

1.02 RELATED SECTIONS

A. Section 01020: Project Forms
B. Section 01027: Application for Payment
C. Section 01040: Project Coordination
D. Section 01330: Submittal Procedures
E. Section 01320: Construction Progress Documentation

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 PREPARATION

A. Upon receipt of the Notice of Intent to Award, CONTRACTOR shall commence preparation of a Schedule of Values in accordance with the form included in Section 01020.

B. CONTRACTOR shall coordinate the preparation of a Schedule of Values with preparation of the Construction Schedule as set forth in Section 01320. The corresponding values from the specification division totals on cost loaded schedule shall match with the approved Schedule of Values.

C. Include the following Project identification on a certified Schedule of Values:

1. Project name and location
2. Project Number
3. Contract #
4. CONTRACTOR name
5. Date of Submittal
D. The Schedule of Values shall be in tabular form with separate columns and shall include the following items:

1. Related Specification Section and Division
2. Description of Work
3. Name of Subcontractor, manufacturer or supplier.
4. Dollar value, quantity and unit of measure of each line item
5. Percentage of Contract amount to nearest one-hundredth percent, adjusted to total 100%

E. Round amounts to the nearest whole dollar; the total shall equal the Contract Amount.

F. Provide a breakdown of the Contract Amount in enough detail acceptable to Construction Manager to facilitate continued evaluation of Application for Payment and progress reports. Coordinate with the Project Manual table of content. Provide line items for subcontract amounts, where appropriate.

G. Provide separate line items for items in the Schedule of Values for total installed value of that part of the Work.

H. Provide separate line item for labor and material when required by the Construction Manager.

I. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item except the amounts shown as separate line items as indicated under Schedule of Values form under Section 01020.

J. Temporary facilities and other cost items that are not direct cost of actual work-in-place shall be shown as separate line items as indicated under Schedule of Values form under Section 01020.

K. An approved certified Schedule of Values shall serve as the basis for the monthly certified Application for Payment.

L. If at any time, OWNER determines, in its reasonable discretion, that the schedule of Values does not approximate the actual cost being incurred by CONTRACTOR to perform the Work, CONTRACTOR shall prepare, for Construction Manager approval, a revised Schedule of Values, which then shall be used as the basis for future progress payments. Without changing the Contract Amount, OWNER reserves the right to require CONTRACTOR:

1. To increase or decrease amounts within the line items in the Schedule of Values; and,
2. To conform the price breakdown to OWNER accounting practice.

3.02 SUBMITTAL

A. CONTRACTOR shall submit five (5) certified copies of a Schedule of Values for review and approval by the Construction manager at least 14 days before the first Application for Payment.
B. Construction Manager will review and if necessary, return the submitted Schedule of Values with summary comments noting items not in compliance with the requirements of the Contract Documents. CONTRACTOR shall revise the submitted Schedule of Values and return five (5) copies within three (3) days of receipt of summary comments.

C. Signature by Construction Manager shall constitute acceptance of the submitted Schedule of Values.

D. An approved copy of the Schedule of Values by Construction Manager will be transmitted to CONTRACTOR, and IOR.

END OF SECTION
<table>
<thead>
<tr>
<th>SECTION No.</th>
<th>TITLE</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>00001</td>
<td>TITLE PAGE</td>
<td></td>
</tr>
<tr>
<td>00005</td>
<td>TABLE OF CONTENTS</td>
<td></td>
</tr>
</tbody>
</table>

**INTRODUCTORY DOCUMENTS**

- 00001 - TITLE PAGE
- 00005 - TABLE OF CONTENTS

**BIDDING AND CONTRACT REQUIREMENTS (NOT REVIEWED BY DSA)**

(SEE ATTACHED DISTRICT TABLE OF CONTENT)

**DIVISION 1 - GENERAL REQUIREMENTS**

- 01000 - ABBREVIATIONS, SYMBOLS, AND ACRONYM (DISTRICT ISSUED)
- 01010 - PHASING OF THE WORK (DISTRICT ISSUED)
- 01020 - PROJECT FORMS (DISTRICT ISSUED)
- 01050 - SCHEDULE OF VALUES (DISTRICT ISSUED)
- 01100 - SUMMARY OF WORK
- 01250 - CONTRACT MODIFICATIONS
- 01280 - APPLICATIONS FOR PAYMENT
- 01310 - PROJECT MANAGEMENT AND COORDINATION
- 01311 - INTERPRETATIONS AND CLARIFICATIONS
- 01320 - PROJECT SCHEDULE
- 01330 - SUBMITTAL PROCEDURES
- 01354 - NOISE AND ACOUSTICS MANAGEMENT
- 01355 - ENVIRONMENTAL MANAGEMENT
- 01400 - QUALITY REQUIREMENTS
- 01420 - REFERENCES
- 01430 - TESTING AND INSPECTION (DISTRICT ISSUED)
- 01500 - TEMPORARY FACILITIES AND CONTROLS
- 01575 - CONSTRUCTION AND DEMOLITION (C&D) WASTE MANAGEMENT
- 01600 - PRODUCT REQUIREMENTS
- 01630 - PRODUCT OPTIONS AND SUBSTITUTIONS
- 01700 - EXECUTION REQUIREMENTS
- 01732 - CUTTING AND PATCHING
- 01770 - CLOSEOUT PROCEDURES
- 01781 - PROJECT RECORD DOCUMENTS
- 01782 - OPERATION AND MAINTENANCE DATA
- 01810 - GENERAL COMMISSIONING REQUIREMENTS
- 01820 - DEMONSTRATION AND TRAINING
- 01890 - EXISTING FACILITY RECONSTRUCTION
DIVISION 2 - SITE WORK
02222 - SELECTIVE DEMOLITION

DIVISION 3 - CONCRETE
03100 - CONCRETE FORMWORK
03200 - REINFORCING STEEL
03300 - CAST IN PLACE CONCRETE

DIVISION 5 - METALS
05090 - ANCHORS AND FASTENERS
05120 - STRUCTURAL STEEL
05505 - MISCELLANEOUS METAL FABRICATIONS
05400 - COLD-FORMED STRUCTURAL METAL FRAMING

DIVISION 7 - THERMAL AND MOISTURE PROTECTION
07620 - SHEET METAL FLASHING AND TRIM
07710 - MANUFACTURED ROOF SPECIALTIES
07900 - JOINT SEALERS

DIVISION 9 - FINISHES
09110 - NON-LOAD BEARING METAL FRAMING
09250 - GYPSUM BOARD
09610 - ACOUSTICAL PANEL CEILINGS
09820 - ACOUSTICAL INSULATION
09905 - FIELD PAINTING

DIVISION 15 - MECHANICAL
15010 - BASIC MECHANICAL REQUIREMENTS
15050 - BASIC MECHANICAL MATERIALS AND METHODS
15070 - MECHANICAL SOUND, VIBRATION AND SEISMIC CONTROL
15075 - MECHANICAL IDENTIFICATION
15080 - MECHANICAL INSULATION
15180 - HEATING AND AIR CONDITIONING PIPING SYSTEMS
15400 - PLUMBING
15411 - DOMESTIC WATER SYSTEM
15420 - DRAINAGE AND VENT SYSTEMS
15488 - NATURAL GAS SYSTEMS
15600 - REFRIGERATION EQUIPMENT
15700 - HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT
15800 - AIR DISTRIBUTION
15900 - HVAC INSTRUMENTATION AND CONTROLS
### SECTION No. - TITLE

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<td>16060</td>
<td>MINOR ELECTRICAL DEMOLITION FOR REMODELING</td>
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<td>CONDUIT</td>
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<td>16123</td>
<td>BUILDING WIRE AND CABLE</td>
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<td>BOXES</td>
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<td>WIRING DEVICES</td>
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<td>16195</td>
<td>ELECTRICAL IDENTIFICATION</td>
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<td>DISCONNECT SWITCHES</td>
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<td>16721</td>
<td>FIRE ALARM AND SMOKE DETECTION SYSTEMS</td>
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</table>

**END OF DOCUMENT**
SECTION 01100

SUMMARY OF WORK

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Summary of Work covered by the Contract Documents

B. Contract Type

C. Work under other contracts

D. Use of premises.

E. College’s occupancy requirements.

F. Work restrictions.

G. Compliance with campus regulations

H. Utility shutdowns

I. Dust Control

J. Noise Control

K. Pollution Control

L. Specification formats and conventions.

1.2 RELATED SECTIONS

A. Section 01500 – Temporary Facilities and Controls: Limitations and procedures governing temporary use of College’s facilities.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: Rio Hondo College, Fitness Center Mechanical Upgrade (LPA Project No. 25069.30).

B. Project Location: Rio Hondo Community College, 3600 Workman Mill Road, Whittier, CA 90601-1699, as shown on the Vicinity Map in the Drawings.

C. Owner: Rio Hondo College, James Poper, Director of Facility Services.

D. Owner’s Representative: Del Terra, references as College’s Representative.

E. Architect: ARCHITECT OF RECORD

LPA, Inc.
5161 California Ave., Suite 100
Irvine, CA 92617-8002
F. The Work: Includes all labor, materials and equipment needed to perform the contract Work as outlined in the Drawings and Specifications for this project, including but not limited to:

1. Construction of new acoustical ceiling system.
2. Plumbing and heating, ventilating and air conditioning systems.
3. Electrical power, lighting and signal systems.
4. Coordination of work being performed by others under separate contracts with the College.
5. Additional general information concerning the Project is provided on the Architectural Drawings. See Drawing G0.01.

G. Hazardous Materials: Removal of hazardous materials, including but not limited to asbestos and lead containing materials, will be the responsibility of the Contractor to perform in a safe, legal and proper manner under this contract.

H. All existing structures, surfaces and materials not included in the Work shall be protected in place shall be the responsibility of the Contractor. Contractor shall stage, limit and coordinate its work so as not to interfere with the operations of the College or other contractors who may be onsite.

1.4 CONTRACT REQUIREMENTS

A. Project will be constructed under a single prime contract.

1. Miscellaneous site and building improvements shall be as specifically directed and shall be priced with stipulated allowances.

B. Obtain all required permits required for work under this contract, including but not necessarily limited to the following:

2. Shoring, SWPPP, trenching and grading permits.
3. Permits required for connection to public services and utilities.

C. Contractor and Subcontractors to be approved and in compliance with the Owner Controlled Insurance Program prior and during project.

D. Contractor and Subcontractors to be approved and in compliance with the Program Labor Agreement and all associated labor requirements prior and during project.

E. Contractor and Subcontractors to comply fully with requirements of College drug testing program.

1.5 WORKS UNDER OTHER CONTRACTS

A. The College reserves the right to let other contracts in accordance with the Contract General Conditions of the Contract.

B. Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.
C. Contractor shall relocate storage areas constructed by Contractor and shall make such other provisions as are necessary to furnish access to the site to other contractors for the execution of their Work, at no additional cost to the College.

1.6 USE OF PREMISES

A. General: Contractor shall have limited use of premises for construction operations as indicated on Drawings by the Contract limits.

1. Limits: Confine construction operations to areas indicated on Drawings.

   a. There may be isolated items that are outside the limits indicated; the scope of items beyond the general limit indicated has been specifically indicated and is to be performed within the scope of the Project.

   b. Work directed and accounted as Allowance items shall be in various locations on the Property and shall be conducted and coordinated per these Specifications.

2. Driveways, Entrances and Roads: Keep driveways and entrances and roads serving the campus and the Project site clear and available to College, College’s employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

   a. Schedule and coordinate deliveries to minimize use of driveways and entrances.

   b. Schedule and coordinate deliveries to minimize space and time requirements for storage of materials and equipment on-site.

3. Use of Site:

   a. Allow College access to maintain and operate other existing facilities.

   b. Maintain and permit unimpeded access by fire fighting or rescue equipment.

   c. Permit exiting from existing facilities for life safety.

   d. Access to and egress from construction site shall be in strict conformance to prearranged routes approved by College, with the understanding that curtailment of traffic or revision of access routes may be required on short notice if College operations mandate such changes because of excessive noise, or problems with safety, service, or supply.

4. Contractor is required to observe all College driving and access restrictions. Each driver must have a valid California driver’s license. Contractor must avoid driving on inner campus. Contractor shall access campus interiors for specific service-related needs (i.e., unloading or emergency response only). Obtain inner campus permit from campus security. Contractor must never exceed posted speed limits and must use discretion when a slower speed may be more appropriate due to congestion. Contractor must use caution at pedestrian crossings (i.e., intersections, crosswalks, and other unmarked areas where frequent crossing occurs). Contractor must remember that the pedestrian has the right of way. Driving on lawns and landscaped areas is prohibited. Contractor must stage deliveries, equipment, and temporarily standing vehicles so as to not block traffic crosswalks, disabled access routes, fire lanes, building entrances, fire hydrants, and walkways. All vehicular traffic is prohibited on brick surfaces, lawns and landscaped areas.

5. At no time shall the Contractor block any disabled access route, store materials, transport materials or equipment, perform work, park or drive through campus in a manner that could endanger the campus population.
6. Parking:
   a. No parking will be permitted on the College property. Contractor will need to arrange for
      offsite parking and transportation. Contractor's employees, subcontractors, and material
      suppliers shall observe all College traffic regulations.
   b. Contractor shall stage all delivery vehicles so as to not block traffic crosswalks, disabled
      access routes, fire lanes, building entrances, fire hydrants, and walkways.

B. Contractor shall be sensitive to and recognize the possibility of encountering cultural artifacts when
   performing excavations and site work. Contractor shall exercise extreme discretion and caution when
   performing excavation and site work activities. The Contractor is required to notify the College in writing
   a minimum of 10 working days prior to any activities which include, but are not limited to, digging,
   trenching, or excavation work.

C. College will review and approve all proposed spaces and routes for the storage of materials and the
   ingress and egress of workers and equipment to the project site. Materials and equipment shall be kept
   strictly within these limits. Coordinate with College and Program Management Team on location and
   limits of exposure.

D. Contractor shall be responsible for all damage to on-campus roads, sidewalks, landscape, hardscape,
   etc., used by construction vehicles and trucks coming to the job. Final decisions as to responsibility shall
   rest with the College when cases arise involving other construction projects on the campus.

E. Contractor shall provide sufficient signage at each building and area under construction, notifying
   occupants and pedestrians of scope, sequence, duration of work, and point of contact for questions,
   comments and concerns.

F. Contractor shall provide and post pedestrian and vehicular detour signs and disabled accessible route
   signs as necessary to provide clear direction around any obstruction caused by construction. Obtain
   approval of any detour from the College at least 5 working days in advance.

G. Contractor(s) shall assume full responsibility for protection and safekeeping of products stored on the
   site under this contract.

1.7 OWNER'S OCCUPANCY REQUIREMENTS

A. Owner Occupancy of Completed Areas of Construction: College reserves the right to occupy and to
   place and install equipment in completed areas of structure before Final Completion, provided such
   occupancy does not interfere with completion of the Work. Such placement of equipment and partial
   occupancy shall not constitute acceptance of the total Work.

   1. College will issue a written contract Change Order for each specific portion of the Work to be
      occupied before Final Completion.

   2. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational,
      and required tests and inspections shall be successfully completed. On occupancy, College will
      operate and maintain mechanical and electrical systems serving occupied portions of building.

   3. On occupancy, College will assume responsibility for maintenance and custodial service for
      occupied portions of building.

1.8 WORK RESTRICTIONS

A. On-Site Work Hours: Work shall be performed during normal business working hours of 7:00 a.m. to
   5:30 p.m., Monday through Friday. Extended and weekend hours may be granted with a written request
   at a minimum of two (2) working days in advance and written approval by College.
1. Coordinate work hours with College's activities so as not to conflict with the Campus daily activities. Always maintain access for students, faculty and staff. The College’s academic calendar is available on the College website. Schedule and coordinate all construction operations with College.
   a. Always maintain access for students, faculty and staff to all areas of the campus.
   b. Building exits during construction. Maintain all building exits. Do not obstruct at any time.

2. Construction operations, such as material deliveries, debris removal, and crane operations, shall not occur when students, staff or visitors are present at construction site. Schedule such operations around school schedule. Where, in the sole opinion of the College, the construction site is sufficiently remote or isolated that students, staff or visitors are not exposed to such operations, construction operations may proceed as scheduled by Contractor in conformance with the Project Manual.

3. College reserves the right to modify such scheduled operations to accommodate school operations or classroom programs. Contractor shall be entitled to contract time extension per contract modification procedures.

4. Contractor shall commence and complete all mobilization activities at the Site and obtain all jurisdictional authorities approval under this contract, within sixty (60) days of site availability.

1.9 UTILITY SHUTDOWNs

A. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by College or others.

1. Contractor must maintain all utilities affected by the construction of this project in an operable and functioning condition (including irrigation systems) to all buildings, facilities, and services on the campus. All costs for providing temporary utilities shall be included in the base bid. Provide temporary utility services according to requirements indicated as necessary to avoid interruption.

B. Campus utility shutdowns in support of this construction Project shall be coordinated with and approved by the Campus. At least 15 working days written notice prior to the desired shutdown is necessary due to the complexity of scheduling. Notice includes submission of a detailed plan describing work activity associated with all utility advance of any utility interruption to the College for approval identifying the sequence of events, responsible people, and shutdowns, including College form. The contents of the plan will be prepared in conjunction with the Construction Manager. Contractor shall not interrupt Campus utilities without prior notification or authorization by the Campus. Unavoidable disruptions shall be repaired immediately.

C. Shutdowns shall be arranged for Saturdays, holidays, and off hours. Contractor shall pay all costs of his crews, including superintendents, for this work and bear reasonable Campus employee overtime costs and pay other costs associated with working other than normal work hours. Major outages shall occur during semester breaks or at other periods as approved by the College.

D. If any utility is interrupted which affects any occupied facility, Contractor shall provide a temporary connection to the affected utility I facility I area with the noted time frame with due diligence, at no additional cost to the College. If the Contractor does not perform repairs with due diligence within the noted time frames, the College will enforce the terms and conditions of the Contract General Conditions for Contractor's failure to perform work in a timely manner.

1. Fire Alarm System: Within 4 hours of occurrence (Provide immediate fire watch)
2. Security Alarm System: Within 4 hours of occurrence
3. Radio Communication System: Within 4 hours of occurrence
4. Telephone I Data Communications System: Within 4 hours of occurrence (Including payphones, fiber backbone, copper, etc.).

5. Energy Management Control System: Within 4 hours of occurrence

6. College Master Clock System: Within 4 hours of occurrence

7. Exterior Lighting I Street Lighting: Within 4 hours of occurrence

8. Building Power: Within 4 hours of occurrence

9. Potable Water: Within 6 hours of occurrence depending on impact of loss of water

10. Gas: Within 4 hours of occurrence

11. Sewer: Within 24 hours of occurrence

12. Storm Drain: Within 48 hours of occurrence

13. Irrigation (including reclaimed water): Within 48 hours of occurrence - provide alternate methods of irrigation if needed during outages to prevent damage to landscape.

1.10 DUST CONTROL

A. Execute Work by methods to eliminate or minimize dust creation from construction operations. Contractor shall be responsible for complying with all applicable regulations regarding dust control.

B. Contractor shall protect adjoining property and nearby buildings, roads and other facilities and improvements from dust, dirt, debris and other nuisances arising out of Contractor’s operations or storing practices and clean as necessary.

C. Provide positive means to prevent air-borne dust from dispersing into atmosphere. Use water mist, temporary enclosures and other suitable methods to limit the spread of dust and direct. If necessary, regular watering program shall be initiated to adequately control the amount of fugitive dust in accordance with applicable AQMD rules. All positive dust control measures shall hold airborne dust to a factor not greater than Step 1 on the Ringleman Scale (re. AQMD Reg. 403). Any exposed soil surfaces shall be sprayed with water at least daily as needed to mitigate dust.

D. Trucks hauling dirt to and from the site shall be covered in accordance with applicable state and local requirements. To reduce exhaust emissions, unnecessary idling of construction vehicles and equipment shall be avoided and vehicles and equipment shall be equipped with exhaust and noise mitigating devices and be kept in good working order.

1.11 NOISE CONTROL

A. The campus will remain occupied and operational during construction. As such, the contractor shall carry on all work in a manner that will produce the least amount of noise during times that the building is occupied. Contractor shall instruct all workers in noise control procedures.

B. The College reserves the right to determine if work being performed by the Contractor is creating disruptions to the operations of the College and if so, to arrange with the Contractor alternate times or methods for completing the work at no additional cost to the College.

C. Construction operations generating excessive noise, such as use of pneumatic tools and powder actuated fastener equipment, shall be scheduled with the College. Provide the College with 24 hours notice prior to commencing such operations.
D. Equip jackhammers with exhaust mufflers and steel muffling sleeves. Use quiet type air compressors such as "whisperized" compressor. Close compressor hoods while equipment is in operations. Use electrically powered rather than gasoline or diesel powered forklifts. Provide portable barriers around jack hammering. Barriers are to be constructed of 3/4 inch plywood lined with 1-inch thick fiberglass on work side at minimum.

E. Locate all noise generating equipment in a remote location away from occupied areas. Keep noisy equipment as far as possible from noise-sensitive sites boundaries. Do not leave machines idling. Use electric power in lieu of internal combustion engine or pneumatic power wherever possible. Maintain equipment properly to reduce noise from excessive vibration, faulty mufflers or other sources. Provide all engines with properly functioning mufflers.

F. Schedule noise generating operations so as to minimize their duration at any given location and to minimize disruption to the adjoining users. Notify the College a minimum of 72 hours in advance of performing work creating unusual noise and schedule such work at times mutually agreeable.

G. Do not play radio, tape recorders, televisions or other similar items at the job site.

1.12 POLLUTION CONTROL

A. Provide methods, means, and facilities to prevent contamination of water and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Contractor shall be responsible for all costs associated with clean-up resulting from discharge of noxious, toxic substances, and pollutants produced by contractor's Work.

1.13 SPECIFICATION FORMAT AND CONVENTION

A. Specification Format: The Specifications are organized into Divisions and Sections using the 16-division format and CSI/CSC's "MasterFormat" numbering system.

1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.

2. Division 1: Sections in Division 1 govern the execution of the Work of all Sections in the Specifications.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

   a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
1.14  COMPLIANCE WITH CAMPUS REGULATIONS

A. College has adopted the policy of prohibiting sexual or racial harassment of any kind on the campus. All employees of the Contractor, subcontractors, materials suppliers, etc., shall treat the students, faculty, and staff of the College with respect and act in a professional manner at all times. Any employee who is demeaning or treats students, staff, and faculty with disrespect shall be immediately removed from the project and barred from future project employment.

B. College has adopted the policy of a Smoke-Free environment. Contractor shall not allow employees or subcontractors, visitors, manufacturer's representatives, etc., to smoke in non-designated areas, including but not limited to any indoor area.

PART 2 - PRODUCTS

Not applicable to this Section

PART 3 - EXECUTION

Not applicable to this Section

END OF SECTION
SECTION 01250

CONTRACT MODIFICATIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

1.2 RELATED SECTIONS

A. Section 01630 - Product Options and Substitutions: Administrative procedures for handling requests for substitutions made after Contract award.

1.3 REFERENCES

A. Change Order Requirements per Title 24 Part 1 CCR.

1. Changes in the plans and specifications are to be made by addenda or change orders approved by the Division of the State Architect (DSA), Title 24 Part 1 Section 4-338.

2. Change Orders: Changes or alterations of the approved plans or specifications after a contract for the work has been awarded are to be made by means of Change Orders. State the reason for the change and provide supplementary drawings where necessary. Change orders must be manually signed by the Architect or Engineer in general responsible charge of observation of the work or by the Architect or Engineer delegated responsibility for observation of the portion of the work affected by the change order.

3. Change orders are required to bear the approval of the District.

4. One original signed copy by all parties of each change order is required for the files of the Division of the State Architect.

1.4 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, in the form of a Bulletin.

1.5 PROPOSAL REQUESTS

A. District-Initiated Requests For Proposals: District will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Requests for Proposal issued by District are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.

2. Within time specified in Proposal Request after receipt, submit a quotation estimating any adjustments to the Contract Sum and the Contract Time necessary to execute the change.
a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include an updated Contractor’s Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to the District.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

4. Include an updated Contractor’s Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

5. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

C. Proposal Request Form: For Change Order proposals, use forms provided by District.

1.6 CHANGE ORDER PROCEDURES

A. On District’s approval of a Proposal Request, a Change Order will be issued for signatures of District and Contractor on form approved by the District.

1.7 CONSTRUCTION CHANGE DIRECTIVE


1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

C. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.
1.8 DSA'S NEW INSPECTION PROGRAM

Compliance will be required with DSA's new Construction Oversight Process for all projects commencing construction after 6/1/13

PART 2 - PRODUCTS

Not applicable to this Section

PART 3 - EXECUTION

Not applicable to this Section

END SECTION
SECTION 01280
APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Administrative and procedural requirements concerning the Contractor’s Application for Payment.

1. Applications for Payment shall be submitted to Architect as indicated in the schedule established by the District-Contractor Agreement.

2. Procedures regarding the Contractor’s Construction Schedule and Submittal Schedule are included in Section 01330 - Submittal Procedures.

1.2 SCHEDULE OF VALUES

A. The Schedule of Values must be prepared in conjunction with the preparation of the Contractor’s Construction Schedule.

1. The Schedule of Values must be submitted no later than 7 days prior to the submittal of the first Application for Payment. Every effort shall be made to submit the Schedule of Values as soon as possible prior to this deadline.

B. Format and Content: The Schedule of Values should be formatted in the most clear and effective manner as to allow logical identification and quantification of work to be completed. The Project Manual Table of Contents may be used as a guide to establish the format for the Schedule of Values:

1. Project Information: Include the following Project Identification on the Schedule of Values:
   
a. Project name, number, and location.
b. Name of the Architect.
c. Contractor’s name and address.
d. Submittal Date.

2. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:
   
a. Activity Name.
b. Related Specification Section.
c. Name of subcontractor.
d. Dollar amount.
e. Percentage of Contract Sum rounded to two decimal places, totaling 100 percent.

3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into specific line items.

4. Round dollar amounts off to the nearest dollar; the total shall equal the Contract Sum.
5. For materials or equipment which may be purchased or fabricated and stored but not yet installed, the Schedule of Values and Application for Payment should provide separate line items for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

6. Updating: Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the District.

B. Payment Application Times: The District-Contractor Agreement indicates the period of construction Work covered by each Application for Payment.

C. Payment Application Forms: Use AIA Document G702 and Continuation Sheets G703 as the form for Application for Payment.

D. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the District. Incomplete applications will not be processed.

1. Entries must correspond with the Schedule of Values and Contractor's Construction Schedule. Update and provide revised schedules if changes have been made.

2. Include amounts of any Change Orders and Construction Change Directives issued during the relevant construction.

3. Transmit each copy with a transmittal form listing attachments, appropriate information and recording related to the application in a manner acceptable to the Architect.

4. Architect will transmit a certificate for payment to District with a copy to the Contractor upon determining if the application is completed and correct.

E. Initial Application for Payment: Acts and submittals that must be submitted and approved prior to or along with submittal of the first Application for Payment:

1. List of subcontractors.

2. Schedule of Values.

3. Contractor's Construction Schedule.


5. Certificates of insurance, insurance policies or OCIP compliance.

6. Performance and payment bonds.

F. Releases: Each Application for Payment submitted must include releases from subcontractors or sub-subcontractors and suppliers for the construction period covered by the previous application.
1. Submit partial releases on each item for the amount requested, prior to deduction from retainage, on each item.

2. When an application shows completion of an item, submit final or full releases.

3. Submit final Application for Payment with or preceded by final releases from every entity involved with performance of Work covered by the application who could lawfully be entitled to payments, liens or stop notices.

4. Release forms: Submit on release forms provided by the District and execute all required formalities.

G. Application for payment at Substantial Completion: Submit an Application for Payment following issuance of the Certificate of Substantial Completion. This application shall reflect any Certificates of Partial Substantial Completion issued previously for District occupancy of designated portions of the Work.

1. Administrative actions and submittals that shall proceed or coincide with this application include:

   a. Project inspector's status of completion.
   b. Warranties (guarantees) and maintenance agreements.
   c. Test / adjust / balance records.
   d. Maintenance instructions.
   e. Meter readings.
   f. Start-up performance reports.
   g. Change-over information related to District's occupancy, use, operation and maintenance.
   h. Final cleaning.
   i. Application for reduction of retainage, and consent of surety.
   j. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.

H. Final Payment Application: Acts and submittals that must be submitted and approved prior to or along with submittal of the final Application for Payment:

1. Completion of Project closeout requirement.

2. Completion of items specified for completion after Substantial Completion.

3. Adequate Assurances regarding unsettled claims.

4. Adequate Assurances that Work not complete and accepted will be completed without undue delay.

5. Transmittal of required Project construction records to District, including but not limited to all as-built documents, warranties and guarantees, training and maintenance manuals, and approvals and certifications.

6. Removal of temporary facilities and services.

7. Removal of surplus materials, rubbish and similar elements and final clean-up.

8. Change of door locks to District's access as directed by District Representative.
PART 2 - PRODUCTS

Not applicable to this Section.

PART 3 - EXECUTION

Not applicable to this Section.

END OF SECTION
SECTION 01310

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General project coordination procedures.
2. Conservation.
3. Coordination Drawings.
4. Administrative and supervisory personnel.
5. Project meetings.

1.2 RELATED SECTIONS

A. Section 01311 - Interpretations and Clarifications: Procedures for making a request for interpretation or clarification of the Contract Documents.

B. Section 01700 - Execution Requirements: Procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

C. Section 01770 - Closeout Procedures: Coordinating Contract closeout.

1.3 COORDINATION

A. Coordination: Coordinate construction operations required by the Contract Documents to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.

3. Make adequate provisions to accommodate items scheduled for later installation, including, but not limited to, coordination of furnishing and placing embedded items, sleeves, and block-outs with formwork and reinforcing steel for cast-in-place concrete.

4. Resolve conflicts and coordinate access to, and utilization of, spaces available for construction activities on the site and within structures, and delivery, storage, and installation of materials and equipment.
5. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.

6. Implement a quality assurance program designed to ensure completion of the Work in accordance with requirements of the Contract Documents.

B. Where necessary, notify each party involved outlining special procedures required for coordination, include such items as required notices, reports, and attendance at meetings.

1. Prepare similar memorandum for the Owner and separate Contractors where coordination of their Work is required or access and use of occupied areas or areas outside the delineated work area will be necessary.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly, efficient and safe progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.

2. Preparation of the Schedule of Values.

3. Installation and removal of temporary facilities and controls.

4. Delivery and processing of submittals.

5. Progress meetings.

6. Pre-installation conferences.

7. Project closeout activities.

8. Obtaining required permits and approvals from authorities having jurisdiction.


D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1.4 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Indicate relationship of components shown on separate Shop Drawings.

2. Indicate required installation sequences.

3. Refer to Division 15 - Mechanical for specific Coordination Drawing requirements for mechanical installations.
B. Staff Identification and Contact Information: Within 15 days of starting construction operations, submit
a list of principal staff assignments, including superintendent and other personnel in attendance at
Project site. Identify individuals and their duties and responsibilities; list addresses and telephone
numbers, including home, office and mobile telephone numbers. Provide names, addresses, and
telephone numbers of individuals assigned as standbys in the absence of individuals assigned to
Project. Post copies of list in Project meeting room, in temporary field office, and by each temporary
telephone.

1.5 PROJECT MEETINGS

A. General: Contractor shall attend and participate in meetings related to the Project and, as determined
necessary by the Contractor, shall schedule and conduct meetings not designated to be scheduled
and conducted by another entity.

B. Preconstruction Conference (Job Start Meeting): The Program Management Team will schedule a
preconstruction conference before starting construction, at a time convenient to Contractor, College's
Representative and Architect, but no later than 15 days after execution of the Agreement. The
conference will be held at Project site or another convenient location.

1. Attendees: College's Representative (Program Management Team), Project Inspector, Architect
and Architect's consultants as applicable; Contractor and its superintendent; major
subcontractors, manufacturers and suppliers as applicable; Contractor's designated safety
manager; and other concerned parties shall attend the conference. All participants at the
conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Discussion will focus on, but not necessarily be limited to, the following items:

a. Suggested Agenda: Pre-Construction Meeting: Distribution and discussion of:
   1) List of major subcontractors schedules.
   2) Projected construction schedules.
   3) Critical work sequencing.
   4) Major equipment deliveries and personnel.
   5) Project Coordination.
   6) Designation of responsible personnel.
   7) Field decisions.
   8) Proposal requests.
   9) Submittals.
  10) Change Orders.
  11) Applications for Payments.
  13) Procedures for maintaining Record Documents.
  14) Use of premise.
  15) Office, work, and storage areas.
  16) District's requirements.
  17) Construction facilities, controls, and construction aids.
  18) Temporary utilities.
  19) Safety and first-aid procedures.
  20) Security procedures.
  21) Housekeeping procedures.
C. Other business - Pre-installation Conferences: Contractor shall conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.

1. Distribute written notice of agenda, meeting time, and location a minimum of 4 calendar days in advance.

2. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise College, Inspector of Record, Architect of Record, Contractor’s Superintendent, and major Subcontractors as requested by Contractor and/or Program Management Team, of scheduled meeting dates.

3. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
   b. Options.
   c. Related Change Orders.
   d. Purchases.
   e. Deliveries.
   f. Submittals.
   g. Review of mockups.
   h. Possible conflicts.
   i. Compatibility problems.
   j. Time schedules.
   k. Weather limitations.
   l. Manufacturer’s written recommendations.
   m. Warranty requirements.
   n. Compatibility of materials.
   o. Acceptability of substrates.
   p. Temporary facilities and controls.
   q. Space and access limitations.
   r. Regulations of authorities having jurisdiction.
   s. Testing and inspecting requirements.
   t. Required performance results.
   u. Protection of construction and personnel.

4. Record significant conference discussions, agreements, and disagreements in meeting minutes and distribute to attendees.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Weekly Progress Meetings:

1. Construction Management Team will prepare and distribute agenda to attendees.

2. Attendees: In addition to representatives of the College and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Notify Construction Management Team in advance about topics for discussion as appropriate to status of Project.

   a. Contractor's Construction Schedule: Review progress since the last meeting. Report whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Report how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

   b. Review present and future needs of each entity present, including the following:
      1) Interface requirements.
      2) Sequence of operations.
      3) Status of submittals.
      4) Deliveries.
      5) Off-site fabrication.
      6) Access.
      7) Site utilization.
      8) Temporary facilities and controls.
      9) Work hours.
      10) Hazards and risks.
      11) Progress cleaning.
      12) Quality and work standards.
      13) Change Orders.
      14) Documentation of information for payment requests.
      15) Status of inspection cards and DSA closeout.

4. Suggested Agenda Progress Meetings:

   a. Review, approval of minutes of previous meeting.
   b. Review of work progress since previous meeting.
   c. Field observations, problems and conflicts.
   d. Problems which impede Construction Schedule.
   e. Review of off-site fabrication, delivery schedules.
   f. Corrective measures and procedures to regain projected schedule.
   g. Revisions to Construction Schedule.
   h. Plan progress schedule, during succeeding work period.
   i. Coordination of schedules.
   j. Review submittal schedules; expedite as required.
   k. Maintenance of quality standards.
   l. Review proposed changes for:
      1) Effect on Construction Schedule and on completion date.
      2) Effect on other contracts of the project.

5. Reporting: Construction Management Team will distribute minutes of the meeting. Upon receipt of minutes, Contractor shall distribute copies of the minutes to other entities on the Contractor's team as applicable.

   a. Schedule Updating: Contractor shall revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
E. Contractor-Subcontractor Coordination Meetings: Contractor shall conduct Project coordination meetings weekly. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences.

1. Provide notice of meeting agenda, time, and location as far in advance as possible.

2. Attendees: In addition to representatives of the Program Management Team that may attend on occasion, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

   a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to Combined Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

   b. Schedule Updating: Revise Combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.

   c. Review present and future needs of each contractor present, including the following:
      1) Interface requirements.
      2) Sequence of operations.
      3) Status of submittals.
      4) Deliveries.
      5) Off-site fabrication.
      6) Access.
      7) Site utilization.
      8) Temporary facilities and controls.
      9) Work hours.
     10) Hazards and risks.
     11) Progress cleaning.
     12) Quality and work standards.
     13) Change Orders.
     14) Status of inspection cards.

4. Reporting: Record meeting results and distribute copies to the District Representative and Architect, as well as everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS

Not applicable to this Section.

PART 3 - EXECUTION

Not applicable to this Section.

END OF SECTION
SECTION 01311

INTERPRETATIONS AND CLARIFICATIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Administrative provisions for requesting information:

1.2 RELATED SECTIONS

A. Section 01310 - Project Management and Coordination: General project coordination procedures.

B. Section 01330 - Submittal Procedures: Administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

C. Section 01600 - Product Requirements: Administrative and procedural requirements for selection of products for use in the Project.

D. Section 01630 - Product Options and Substitutions: Product substitutions and comparable products.

1.3 DEFINITIONS

A. Request For Information (RFI): A written document submitted by the Contractor requesting interpretation or clarification of a portion of the Contract Documents.

1.4 RFI PROCEDURE

A. Coordinate preparation and submittal of each Request for Information (RFI) to avoid conflicts and to ensure orderly progress of the Work. Submit each RFI immediately upon discovery of the need for interpretation or clarification and within a time frame that will allow for appropriate review and response without causing a delay in construction progress and the need for revision of the construction schedule.

   1. Time for Response to RFI: The amount of time necessary for appropriate review and response to a RFI will vary. Typically, a response will be issued within 14 days. Complex issues may require additional time. Contractor will be notified in writing if a response will take more than 14 calendar days.

B. Requests for Information (RFI): Make requests for information in writing to the Construction Manager immediately after the Contract Documents have been thoroughly reviewed with regard to a specific issue and an interpretation or clarification of the Contract Documents regarding that issue is required.

   1. Requests for interpretation or clarification submitted to the Program Management Team will be logged in Expedition. The Construction Manager or Architect will only review Requests for Interpretation or Clarification received directly in the required written form provided by the Program Management Team.
2. Assign a RFI number to each RFI. Assign numbers sequentially, in three digits, starting with 001. Add an alphabetical suffix to the RFI number for each resubmission of that RFI. For example, number the first RFI as "001." Number the second RFI "002." Identify the first re-submittal of RFI "002" as "002a" and subsequent re-submittals in alphabetical sequence.

3. Submit a RFI only if one of the following conditions occur:
   a. Discovery, after thorough review, of an unforeseen condition or circumstance that is not addressed in the Contract Documents.
   b. Discovery, after thorough review, of an apparent conflict or discrepancy between portions of the Contract Documents that appears to be inconsistent with, or is not reasonably inferred from, the intent of the Contract Documents.
   c. Discovery, after thorough review, of an apparent omission from the Contract Documents that can not be reasonably inferred from the intent of the Contract Documents.

4. Do not submit a RFI in place of any of the following:
   a. A request for substitution of material, product, or method of construction.
   b. A Product Data, Shop Drawing, or other submittal required by the Contract Documents.
   c. A Change Order Request.
   d. Coordination required of the Contractor by the Contract Documents.

5. A Request for Information and the Construction Manager's or Architect's response does not alter or change the requirements of the Contract Documents, does not serve and will not be considered as a product data or shop drawing submittal, substitution request, Request for Proposal or Change Order Request, and is not an authorization to proceed in a manner resulting in Work that does not comply with the Contract Documents or results in increased time or extra cost to the District.
   a. Comply with the Contract General Conditions for issues related to Change Orders.

6. When the Contract Documents clearly identify the information requested by the Contractor in a RFI, the Contractor shall reimburse the District for costs, including, but not limited to, labor costs at Architect's normal hourly billing rates and reimbursable expenses at cost plus 15 percent incurred by the Architect in reviewing the unnecessary RFI.

C. RFI Log: A log for recording information about RFI status and responses will be provided by the Construction Manager, who will maintain and continuously update the RFI Log.
   1. Make corrections to Log entries as directed by the Construction Manager.

1.5 FORM OF RFI

A. Submit a legible written request on the required RFI form, including the following information:
   1. Project name, as listed on the Contract Documents, and Architect's and Specifications.
   2. Date.
   3. Name, address, telephone and FAX numbers of the Contractor.
   4. Name of individual making the request.
5. Number and title of appropriate Specification Section or Sections.

6. Drawing numbers and detail references, as appropriate.

7. RFI Number.

8. Clear, concise, explanation of information or clarification requested.

9. Clear, concise explanation of Contractor’s assumed interpretation or clarification of the issue.
   a. Include written description of proposed solution and submit graphic description of proposed solution, as applicable.

10. Submit photograph of area in question when requesting clarification or interpretation of an issue relating to a portion of Work in place or Work to be adjoined or installed to Work in place.

PART 2 - PRODUCTS

Not applicable to this Section

PART 3 - EXECUTION

Not applicable to this Section

END OF SECTION
SECTION 01320
PROJECT SCHEDULE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Initial Construction Schedule.
2. Contractor's Construction Schedule.
4. Daily construction reports.
5. Material location reports.
6. Field condition reports.
7. Special reports.

1.2 RELATED SECTIONS

A. Section 01280 - Applications for Payment: Submission of Schedule of Values.

B. Section 01310 - Project Management and Coordination: Submission and distribution of meeting and conference minutes.

C. Section 01330 - Submittal Procedures: Submission of schedules and reports.

D. Section 01400 - Quality Requirements: Submission of schedule of tests and inspections.

E. Section 01770 - Closeout Procedures: Submission of photographic negatives as Project Record Documents at Project closeout.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.

2. Predecessor activity is an activity that must be completed before a given activity can be started.
B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

C. Critical Path: The longest continuous series of activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Event: The starting or ending point of an activity.

E. Float: The measure of leeway in starting and completing an activity.
   1. Float time is not for the exclusive use or benefit of either College or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
   2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.
   3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

F. Fragment: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

G. Major Area: A story of construction, a separate building, or a similar significant construction element.

H. Milestone: A key or critical point in time for reference or measurement.

I. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

1.4 SUBMITTALS

A. Qualification Data: For firms and persons specified in Article titled QUALITY ASSURANCE and in-house scheduling personnel to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

B. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:
   1. Scheduled date for first submittal.
   2. Specification Section number and title.
   3. Submittal category (action or informational).
   4. Name of subcontractor.
   5. Description of the Work covered.
   6. Scheduled date for Architect's and Construction Manager's final release or approval.
C. Initial Construction Schedule: Submit two printed copies; one a single sheet of reproducible media, and one a print to each recipient.

D. Initial Network Diagram: Submit two printed copies; one a single sheet of reproducible media, and one a print; large enough to show entire network for entire construction period to each recipient.

E. Contractor's Construction Schedule: Submit two printed copies of schedule, one a reproducible print and one a blue- or black-line print, large enough to show entire schedule for entire construction period to each recipient.

F. CPM Reports: Concurrent with CPM schedule, submit three printed copies of each of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.

2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.

3. Total Float Report: List of all activities sorted in ascending order of total float.

4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.

G. Daily Construction Reports: Submit two copies at weekly intervals.

H. Material Location Reports: Submit two copies at weekly intervals.

I. Field Condition Reports: Submit two copies at time of discovery of differing conditions.

J. Special Reports: Submit two copies at time of unusual event.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting.

B. Pre-scheduling Conference: Conduct conference at Project site to comply with requirements in Section 01310 - Project Management and Coordination. Review methods and procedures related to the Preliminary Construction Schedule and Contractor's Construction Schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.

2. Verify availability of qualified personnel needed to develop and update schedule.

3. Discuss constraints, including work stages, interim milestones, and partial District occupancy.


5. Review schedule for work of under separate contracts for District.
6. Review time required for review of submittals and re-submittals.
7. Review requirements for tests and inspections by independent testing and inspecting agencies.
8. Review time required for completion and startup procedures.
9. Review and finalize list of construction activities to be included in schedule.
10. Review submittal requirements and procedures.
11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from parties involved
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

C. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities including temporary lighting.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review of minimum 14 to maximum 30 calendar days as indicated in Article 6.14 of the General Conditions, re-submittal, ordering, manufacturing, fabrication, and delivery when establishing dates.

1. Coordinate Submittal Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.

2. Initial Submittal: Submit concurrently with preliminary network diagram. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Procedures: Comply with these specifications and good trade practice in preparation of the schedule.
B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

C. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 30 days, unless specifically allowed by Construction Manager.

2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.


4. Startup and Testing Time: Include not less than 15 days for startup and testing.

5. Final Completion: Indicate completion in advance of date established for Final Completion, and allow time for Construction Manager’s administrative procedures necessary for certification of Final Completion.

D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.

2. Work by District: Include a separate activity for each portion of the Work performed by District personnel or by others under separate contract with District.

3. Work Restrictions: Show the effect of the following items on the schedule:
   a. Coordination with existing construction.
   b. Limitations of continued occupancies.
   c. Uninterruptible services.
   d. Partial occupancy before Final Completion.
   e. Use of premises restrictions.
   g. Seasonal variations.
   h. Environmental control.

4. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
   a. Subcontract awards.
   b. Submittals.
   c. Purchases.
   d. Mockups.
e. Fabrication.

f. Sample testing.

g. Deliveries.

h. Installation.

i. Tests and inspections.

j. Adjusting.

k. Curing.

l. Startup and placement into final use and operation.

E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion and Final Completion.

F. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.

1. Refer to Section 01290 - Applications for Payment, for cost reporting and payment procedures.

G. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.

H. Computer Software: Prepare schedules using a program that has been developed specifically to manage construction schedules, compatible with current version of Primavera scheduling software and Expedition.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Initial Construction Schedule/Initial CPM Network Diagram: Submit diagram within 30 days of date established for the Notice to Proceed to the College with copy to the Architect and the Construction Manager. Outline significant construction activities for the first 60 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's Construction Schedule using a CPM network analysis diagram.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 15 days after date established for Program Management Team review of Initial Construction Schedule.

2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.

3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.

4. Use "one workday" as the unit of time.
D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
   a. Preparation and processing of submittals.
   b. Purchase of materials.
   c. Delivery.
   d. Fabrication.
   e. Installation.

2. Processing: Process data to produce output data or a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.

3. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
   a. Sub-networks on separate sheets are permissible for activities clearly off the critical path.

E. Initial Issue of Schedule: Prepare initial network diagram from a list of straight “early start-total float” sort. Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Principal events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
10. Dollar value of activity (coordinated with the Schedule of Values).

F. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
5. Changes in the critical path.
6. Changes in total float or slack time.
8. Submit updated schedule printouts 5 days before each regularly submitted monthly pay request.

2.4 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
   1. List of subcontractors at Project site.
   2. List of separate contractors at Project site.
   3. Approximate count of personnel at Project site.
   4. High and low temperatures and general weather conditions.
   5. Accidents.
   6. Meetings and significant decisions.
   7. Unusual events (refer to special reports).
   8. Stoppages, delays, shortages, and losses.
   9. Meter readings and similar recordings.
   10. Emergency procedures.
   11. Orders and requests of authorities having jurisdiction.
   12. Change Orders received and implemented.
   13. Services connected and disconnected.
   14. Equipment or system tests and startups.
   15. Partial Completions and occupancies.
   16. Final Completions authorized.

B. Material Location Reports: At weekly intervals, prepare a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.
C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the
Contract Documents, prepare a detailed report. Submit with a request for information as indicated
in Section 01310 - Project Management and Coordination. Include a detailed description of the
differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

A. General: Submit special reports directly to the Program Management Team within one day of an
occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project
site, whether or not related directly to the Work, prepare and submit a special report. List chain of
events, persons participating, response by Contractor's personnel, evaluation of results or effects,
and similar pertinent information. Advise the Program Management Team in advance when these
events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using
CPM scheduling.

1. In-House Option: College may waive the requirement to retain a consultant if Contractor
employs skilled personnel with experience in CPM scheduling and reporting techniques.
Submit qualifications.

2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged
delays, and time impact.

B. Contractor’s Construction Schedule Updating: At monthly intervals, update schedule to reflect actual
construction progress and activities. Issue schedule 5 days before each regularly submitted monthly
pay request.

1. Revise schedule immediately after each meeting or other activity where revisions have been
recognized or made. Issue updated schedule concurrently with the report of each such
meeting.

2. Include a report with updated schedule that indicates every change, including, but not limited
to, changes in logic, durations, actual starts and finishes, and activity durations.

3. As the Work progresses, indicate Actual Completion percentage for each activity.

C. Distribution: Distribute copies of approved schedule to the Program Management Team,
Construction Manager, Architect, separate contractors, testing and inspecting agencies, and other
parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION
SECTION 01330

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Administrative procedures and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals, including:

1. Product Data.

2. Shop Drawings.

3. Samples.

4. Product Schedule or List

5. Delegated-Design Submittal.

6. Preliminary construction schedule.

7. Contractor's construction schedule.

8. Submittals schedule.

9. Applications for payment.

10. Schedule of Values.

11. Subcontract List.

12. Informational Submittals (including a listing of extra stock materials and the Contractor's Punch List).

13. Contractor's Daily Reports.

1.2 RELATED DOCUMENTS AND SECTIONS

A. College-Contractor Agreement and General Conditions of the Contract: Additional requirements, including requests for Alternatives or Equals and for Substitutions.

B. General Contract Conditions of Contract: Submission of Applications for Payment.

C. Section 01310 - Project Management and Coordination: Submission of Coordination Drawings.

D. Section 01320 - Project Schedule: Submittals Schedule.

E. Section 01352 - Sustainable Design Requirements: Submittals for Project materials cost data, Erosion and Sedimentation Control Plan and Material Safety Data Sheets (MSDS) confirming VOC emissions.
F. Section 01400 - Quality Requirements: Submission of test and inspection reports and Delegated-Design Submittals and for erecting mockups.


H. Section 01770 - Closeout Procedures: Submission of warranties. Include DSA CLOSEOUT.

I. Section 01781 - Project Record Documents: Submission of Record Drawings and Record Specifications.

J. Section 01782 - Operation and Maintenance Data: Submission of operation and maintenance manuals.

1.3 CONTRACTOR RESPONSIBILITIES

A. Contractor Responsibilities, General: Review shop drawings, and product data prior to submission. Provide review stamp on submittals. See Example "A" form at the end of this section.

B. Determine and Verify:
   1. Field Measurements.
   2. Field construction criteria.
   3. Catalog numbers and similar data.

C. Coordinate each submittal with requirements of the work and of the Contract documents.

D. Notify the Architect in writing, at the time of submission, of any deviations in the submittals from requirements of the Contract Documents.

1.4 SUBMITTAL PROCEDURES

A. General: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Assign a "Submittal Number" to each submittal. Assign numbers sequentially, in three digits, starting with 001. Add an alphabetical suffix to the submittal number for each resubmission of that submittal. For example, number the first submittal as "001." Number the second submittal "002." Identify the first re-submittal of submittal "002" as "002a" and subsequent re-submittals in alphabetical sequence.
   2. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
3. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
   
a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Submittals Schedule: Comply with requirements in Contract General Conditions for list of submittals and time requirements for scheduled performance of related construction activities.

D. Spare and Extra Materials List: Prepare and submit a list of all spare parts and extra stock of materials required by the Contract Documents. Include quantities and volumes, as applicable, of each spare part and material. Include this list with the Submittals Schedule.

E. Processing Time: Allow enough time for submittal review, including time for re-submittals, as follows. "Sufficient time," as used in this Section means a minimum of 15 calendar days for each review cycle.

1. Initial Review: Allow a minimum of 15 calendar days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect will advise Contractor when a submittal being processed must be delayed for coordination. Allow a minimum of 45 calendar days for initial review of submittals for the following:
   
a. Structural steel.
b. Cold-formed metal framing.
c. Metal wall panels.
d. Interior architectural woodwork.
e. Curtain wall and storefront.
f. Doors and door hardware.
g. Mechanical and electrical equipment supports.
h. Ductwork.
i. Fire alarm system.
j. Fire sprinkler system.
k. Building automation control system.
l. Elevators.
m. Rooftop air handling units.
n. Electrical switchgear.
o. Lighting, both interior and exterior.
p. Lighting controls.
q. HVAC equipment and accessories.
r. Any item of work that the Contractor believes that, due to the nature or complexity of the submittal, may require additional time for review by the Architect.

2. If intermediate submittal is necessary, process it in same manner as initial submittal.

3. No extension of the Contract Time will be authorized because of failure to transmit submittals sufficiently in advance of the Work to permit processing.

4. Except where the Specifications specifically call for more than one submittal of the same item, or in the event an initial submittal results in substantial clarification of the Contract Documents by the Architect or Program Management Team, the Architect has allowed time for review of initial submittal and 1 re-submittal. If after 1 re-submittal beyond the number of submittals required by
the Specifications or by clarification, the Contractor may be held responsible for costs incurred in reviewing the additional re-submittals.

F. Contractor Review and Approval: Thoroughly review each submittal for compliance with the Contract Documents prior to transmitting. Do not transmit a submittal to the Architect until that submittal is approved by the Contractor and marked "APPROVED" as indicated under "Submittal Preparation" Paragraph and signed by Contractor. Failure to comply with this requirement will result in return of the submittal with no action taken by the Architect.

G. Re-submittals: Promptly make required corrections and resubmit to the Architect only those submittals which the Architect has specifically requested be resubmitted by placing the mark "Revise and Resubmit" on the original submittal or transmittal.

1. Clearly identify revisions made to a submittal which were not specifically requested by the Architect on previous submissions.

2. Do not resubmit Shop Drawings or other submittals that have not been requested as re-submittals by the Architect.

3. If an error is discovered or a change is made for any reason to a submittal previously marked "Reviewed" by the Architect, resubmit the submittal with all changes made since the prior review clearly marked and noted. Provide written explanation of each change and the reason the change is required.

4. When resubmitting a Sample, clearly mark the Sample with the words "Resubmitted Sample" in addition to other information required.

H. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.

2. Provide a space approximately 5 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect. On Samples, physically attach label (paper, plastic, or cardboard form) to the sample. On Product Data, attach a separate sheet if there is not adequate space on the Product Data.

3. Include the following information on label for processing and recording action taken:

   a. Project name, as listed on the Contract Documents. DSA # and other related identifying number, if any, on the drawings and specifications.
   b. Date of current submission and dates of all previous submissions of the same submittal, if applicable.
   c. Name and address of Contractor.
   d. Submittal Number, including alphabetic revision indicator, if applicable.
   e. Number and title of appropriate Specification Section.
   f. Drawing number and detail references, as appropriate.
   g. Contractor's review certification indicating submittal is "Approved" by the Contractor.
   h. The Construction Schedule activity number to which the submittal pertains.
   i. Other necessary identification.

4. In addition to space provided on label or title block for Contractor's information, provide a separate blank space approximately 4 by 5 inches on the label or beside the title block on Shop Drawings to record the Architect's review markings and the action taken.
I. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

J. Additional Copies:

1. As requested, submit one copy of submittal to concurrent reviewer in addition to specified number of copies to the Architect.

2. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.

K. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.

1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations and reasons for deviations. Include the same label information as the related submittal.

2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.

3. Transmittal Form: Upon approval by the College's Representative and Architect, use Contractor's standard transmittal form indicating all required information for transmittal of submittals. Note that the submittal will also be tracked electronically using a transmittal form generated by the electronic system of the College's Representative. Provide locations on form for the following information:

   a. Project name and Architect's project number, DSA A#, and related other identifying number, if any.
   b. Date.
   c. Name, address, telephone and FAX numbers of the Contractor.
   d. Name and address of the subcontractor.
   e. Name and address of the supplier.
   f. Name and address of the manufacturer.
   g. Number and title of appropriate Specification Section.
   h. Drawing number and detail references, as appropriate.
   i. Submittal Number.
   j. Signature of transmitter.

L. Method of Transmittal: Transmit submittals by first class mail, over-night mail, messenger, or personal delivery to the office of the Architect. Use method necessary to maintain schedule.

M. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

N. Use for Construction: Use only final submittals with mark indicating action taken by Architect in connection with construction.
O. Submittal Log: A log for recording information about submittal status and responses will be provided in the project’s electronic system. Maintain and continuously update the Submittal Log in the project system.

1. Cross reference to the first activity of the Construction Schedule, which will be dependent on the approved submittal.

2. Make corrections to Log entries as directed by the College's Representative.

1.5 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Critical Path Schedule: Prepare a fully developed, Critical Path Type Contractor's construction schedule per Schedule specification. Submit Schedule prior to first payment request, but no later than 30 days from the date of the College's Notice to Proceed.

1. Provide a separate time for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the work as indicated in the "Schedule of Values".

2. Within each time indicate estimated completion percentage in 10 percent increments. As Work progresses, place a contrasting mark in each bar to indicate Actual Completion.

3. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, or sufficient width to show data for the entire construction period.

4. Coordinate the Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests and other schedules.

5. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Architect's procedures necessary for certification of Substantial Completion.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General Submittals: Prepare and submit Action Submittals required by individual Specification Sections.

1. Number of Copies:

a. Submit at least eight (8) copies of each 8-1/2 x 11-inch submittal, including any additional copies as required by Architect. Architect will return 3 copies. Mark up and retain one returned copy as a Project Record Document.

b. Submit at least one (1) reproducible sepio or photocopy vellum of each Shop Drawing and 5 sets of black or blue-line prints, or photocopy bond prints, including any additional copies as required by Architect. Architect will return the reproducible drawings and 2 sets of prints. Mark up and retain one returned copy as a Project Record Document.
B. **Product Data:** Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.

2. Mark each copy of each submittal to show which products and options are applicable.

3. Include the following information, as applicable:
   
   a. Manufacturer's written recommendations.
   b. Manufacturer's product specifications.
   c. Manufacturer's installation instructions.
   d. Standard color charts.
   e. Manufacturer's catalog cuts.
   f. Wiring diagrams showing factory-installed wiring.
   g. Printed performance curves.
   h. Operational range diagrams.
   i. Mill reports.
   j. Standard product operating and maintenance manuals.
   k. Compliance with recognized trade association standards.
   l. Compliance with recognized testing agency standards.
   m. Application of testing agency labels and seals.
   n. Notation of coordination requirements.

4. Where manufacturer's printed literature is required to be submitted, submit an original printed form of the literature. Reproductions which will fade with time or exposure, cut off portions of text or graphics, or are not clear enough to allow further accurate reproduction are not acceptable.

C. **Shop Drawings:** Prepare Project-specific information, drawn accurately to scale. Highlight, encircle, or otherwise clearly indicate deviations from the Contract Documents, if any, along with a notation which reads "VARIATION FROM CONTRACT DOCUMENTS." Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. **Preparation:** Include the following information, as applicable:

   a. Dimensions.
   b. Identification of products.
   c. Fabrication and installation drawings.
   d. Roughing-in and setting diagrams.
   e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
   f. Shopwork manufacturing instructions.
   g. Templates and patterns.
   h. Schedules.
   i. Design calculations.
   j. Compliance with specified standards.
   k. Notation of coordination requirements.
   l. Notation of dimensions established by field measurement.
   m. Drawing title, number of each drawing (number drawings consecutively), total number of drawings contained in set, date and scale.
n. Arrangements and plan, elevation, sectional views, and details as necessary to fully describe the work, including complete information for making connections with other work.

o. List of all subcontractors involved.

p. Identification of finishes on all materials.

q. Show descriptive names of materials and equipment, and locations at which materials and equipment are to be installed in the Work. Use same reference identification as shown on the Contract Drawings.

2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring

3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets of size sufficient to show information clearly at a proper scale, and at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.

4. Number of Copies: Submit copies of each submittal, as follows:

   a. Submittal: Submit 6 blue- or black-line prints. Architect will require a minimum of four (4) prints.

D. Samples: Prepare physical units of materials or products, including the following:

1. Comply with requirements in Section 01400 - Quality Requirements, for mockups.

2. Samples for Initial Selection: Where colors and other characteristics are not pre-selected, submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

3. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

4. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's sample where so indicated. In addition to information required elsewhere in this Section for label, include the following on the permanent label attached to the unexposed side of the Sample.

   a. Specification Section number and reference.
   b. Generic description of Sample.
   c. Product name and name of manufacturer.
   d. Sample source.
   e. Model or catalog number, finish numbers and designations and other identifying information.

5. Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, provide the following:

   a. Size limitations.
   b. Compliance with recognized standards.
   c. Availability.
   d. Delivery time.
6. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
   
a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least three (3) sets of paired units that show approximate limits of the variations.
   
b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
   
7. Number of Samples for Initial Selection: Submit one (1) full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
   
8. Number of Samples for Verification: Submit three (3) sets of Samples. Architect will retain one (1) Sample set; remainder will be returned. Mark up and retain one (1) returned Sample set as a Project Record Sample.
   
a. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
   
9. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
   
a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   
b. Samples not incorporated into the Work, or otherwise designated as University's property, are the property of Contractor.
   
10. The Architect reserves the right to require submission of samples of any materials, whether or not required in the Specifications.
   
11. The Architect will not issue the final Color Schedule for the Project until all required Samples have been submitted and favorably reviewed by the Architect.
   
12. Provide materials and installation in the Work that match in every respect Samples favorably reviewed by the Architect. After a Sample has been favorably reviewed by the Architect, no change in make, model, finish or other characteristics will be permitted in materials and installation incorporated in the Work.
   
13. Architect's favorable review of Samples will not preclude rejection of Work discovered to have defects or that is otherwise not in compliance with the Contract Documents and which defects or noncompliance reviewed Samples failed to represent.
   
14. Ensure Samples of materials requiring laboratory tests are tested sufficiently in advance of the time they are required for submittal to the Architect so as to cause no delay.

E. Product Schedule or List: Prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product.

2. Number and name of room or space.

3. Location within room or space.

G. Delegated-Design Submittal: Comply with requirements in Section 01400 - Quality Requirements.

H. Preliminary Construction Schedule: Comply with requirements in Section 01320 - Project Schedule.

I. Submittals Schedule: Comply with requirements in the Contract General Conditions.

J. Application for Payment and Schedule of Values: Comply with requirements in the Contract General Conditions.

K. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.

2. Number and title of related Specification Section(s) covered by subcontract.

3. Drawing number and detail references, as appropriate, covered by subcontract.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections and complying with DSA and all relevant requirements.

1. Number of Copies: Submit two (2) copies of each submittal, unless otherwise indicated. Architect will not return copies.

2. Certificates and Certifications: Provide a notarized statement that includes signature of Contractor, testing agency, or design professional responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of the company and must comply with DSA and all relevant requirements.

3. Test and Inspection Reports: Comply with requirements in Section 01400 - Quality Requirements.

B. Contractor's Construction Schedule: Comply with requirements in the Contract General Conditions.

C. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

D. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with DSA and all relevant requirements.
F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with DSA and all relevant requirements.

G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with DSA and all relevant requirements. Include evidence of manufacturing experience where required.

H. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.

I. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.

J. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements.

K. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

L. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.

M. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

N. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

O. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Section 01782 - Operation and Maintenance Data.
P. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

Q. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.
7. Identify, in writing, discrepancies between Manufacturer's Instructions and requirements of the Contract Documents.

R. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

S. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

2.3 COLOR SCHEDULE
A. Within ninety (90) calendar days of Notice to Proceed, submit a complete list of all materials for which colors are to be selected by the Architect.

   1. Include manufacturer's name and all other pertinent data which will facilitate completion of color selections by the Architect.

   2. Submit samples for color selection in full range of applicable manufacturer's full line of standard colors.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

   A. Review each submittal and check for compliance with the Contract Documents, including, but not limited to, dimensions, products, connections, coordination with other work in sequence, schedule and fit. Note corrections and field dimensions. Mark with approval stamp before submitting to College's Representative.

   B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

   A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

   B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

   1. Final Unrestricted Release: When the Architect marks a submittal "Reviewed," the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.

   2. Final-But-Restricted Release: When the Architect marks a submittal "Furnish as Corrected," the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.

   3. Returned for Re-submittal: When the Architect marks a submittal "Revise and Resubmit," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.

   a. Do not use, or allow others to use, submittals marked "Revise and Resubmit" at the Project Site or elsewhere where Work is in progress.

   4. Other Action: Where a submittal is for information or record purposes or special processing or other activity, the Architect will return the submittal marked "Action Not Required."
C. Informational Submittals: Architect will review each submittal and will not return it, or will reject and return it if it does not comply with requirements. College's Representative will forward each submittal to appropriate party.

D. Submittals not required by the Contract Documents will not be reviewed and will be returned to the sender without action.

END OF SECTION
SECTION 01354

NOISE AND ACOUSTICS MANAGEMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Special requirements for noise and acoustics management during demolition and new construction operations.

1.2 RELATED SECTIONS

A. Section 01310 - Project Management and Coordination: Environmental Manager and Contractor training requirements.

B. Section 01400 - Quality Requirements: Meetings and project coordination related to quality control.

1.3 DEFINITIONS

A. Ambient noise level: The total noise associated with a given environment, being usually a composite of normal or existing sounds from all sources near and far, excluding the noise source at issue.

B. Daytime: The hours from 7 a.m. to 9 p.m. on weekdays and 9 a.m. to 9 p.m. on weekends and holidays.

C. Nighttime: All non-daytime hours.

D. Property line: The real or imaginary line along the ground surface and its vertical extension, which separates real property owned or controlled by one person from contiguous real property owned or controlled by another person or from any public right-of-way or from any public space.

E. Receiving noise area: Any real property where people live or work and where noise is heard, excluding the project or source area.

PART 2 - PRODUCTS

Not Applicable to this Section.

PART 3 - EXECUTION

3.1 NOISE MANAGEMENT

A. Noise Control: Perform demolition construction operations to minimize noise. Perform noise-producing work in less sensitive hours of the day or week as directed by City's Representative.
B. Repetitive and/or intermittent, high-level noise: Permitted only during Daytime.

1. Do not exceed the following dB limitations:

<table>
<thead>
<tr>
<th>Sound Level in dB</th>
<th>Time Duration of Impact Noise</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>More than 12 minutes in any hour</td>
</tr>
<tr>
<td>80</td>
<td>More than 3 minutes in any hour</td>
</tr>
</tbody>
</table>

2. Provide equipment, sound-deadening devices, and take noise abatement measures that are necessary for compliance.

3. Maximum permissible construction equipment noise levels at 50 feet (dB):

<table>
<thead>
<tr>
<th>EARTHMOVING</th>
<th>dB</th>
<th>MATERIALS HANDLING</th>
<th>dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front Loaders</td>
<td>75</td>
<td>Concrete Mixers</td>
<td>75</td>
</tr>
<tr>
<td>Backhoes</td>
<td>75</td>
<td>Concrete Pumps</td>
<td>75</td>
</tr>
<tr>
<td>Dozers</td>
<td>75</td>
<td>Cranes</td>
<td>75</td>
</tr>
<tr>
<td>Tractors</td>
<td>75</td>
<td>Derricks Impact</td>
<td>75</td>
</tr>
<tr>
<td>Scrapers</td>
<td>80</td>
<td>Pile Drivers</td>
<td>95</td>
</tr>
<tr>
<td>Graders</td>
<td>75</td>
<td>Jack Hammers</td>
<td>75</td>
</tr>
<tr>
<td>Trucks</td>
<td>75</td>
<td>Rock Drills</td>
<td>80</td>
</tr>
<tr>
<td>Pavers, Stationary</td>
<td>80</td>
<td>Pneumatic Tools</td>
<td>80</td>
</tr>
<tr>
<td>Pumps</td>
<td>75</td>
<td>Saws</td>
<td>75</td>
</tr>
<tr>
<td>Generators</td>
<td>75</td>
<td>Vibrators</td>
<td>75</td>
</tr>
<tr>
<td>Compressors</td>
<td>75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C. Ambient Noise:

1. Maximum noise levels (dB) for receiving noise area at property line shall be as follows:

   a. Residential receiving area: Daytime: 65 dB, Nighttime: 60 dB

2. In the event the existing local ambient noise level exceeds the maximum allowable receiving noise level (dB), the receiving noise level maximum for construction operations shall be adjusted as follows:

3. Residential receiving area: Maximum 3 additional dB above the local ambient as measured at property line.

4. Commercial/Industrial receiving area: Maximum 5 additional dB above the local ambient as measured at the property line.

3.2 FIELD QUALITY CONTROL

A. Assessment: Assess potential effects of construction noise on occupants of adjacent facilities, including neighboring properties, in accordance with ASTM E 1686 and as follows:
1. Ambient noise measurement: Measure at the property line at a height of at least four (4) feet above the immediate surrounding surface. Average the ambient noise level over a period of at least 15 minutes.

2. Ambient noise measurement at urban sites: Conduct during morning peak traffic hour between 7 a.m. and 9 a.m. and afternoon peak traffic hour between 4 p.m. and 6 p.m. In addition, conduct a 24-hour measurement at the proposed project site to document the noise pattern throughout the day. Adjust and weight for seasonal and climatic variations.

B. Monitor noise produced from construction operations in accordance with ASTM E 1780.

END OF SECTION
SECTION 01355
ENVIRONMENTAL MANAGEMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section includes:

1. Special requirements for environmental management during construction operations.

2. Monitoring requirements.

1.2 RELATED SECTIONS

A. Section 01100 - Summary of Work: Erosion and Sedimentation Control (ESC) Plan.

B. Section 01310 - Project Management and Coordination: Environmental Manager and Contractor training requirements.

C. Section 01400 - Quality Requirements: Meetings and project coordination regarding quality.

D. Section 02230 - Site Clearing: Removal and storage of existing topsoil.

1.3 DEFINITIONS

A. Definitions pertaining to sustainable development: As defined in ASTM E 2114.

B. Environmental pollution and damage: The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances; or degrade the utility of the environment for aesthetic, cultural, or historical purposes.

1.4 PRECONSTRUCTION MEETING

A. Preconstruction Meeting: After award of Contract and prior to the commencement of the Work, schedule and conduct meeting attended by College’s Representative, Architect and Contractor to discuss the proposed Environmental Protection Plan and to develop mutual understanding relative to details of environmental protection. Coordinate with Section 01310 - Project Management and Coordination.

1. Schedule meeting in conjunction with preconstruction meeting for Environmental Regulatory Requirements.

2. Verify procedures and requirements necessary to ensure implementation of Environmental Protection Plan is coordinated with applicable environmental regulatory requirements.

1.5 SUBMITTALS

A. Environmental Protection Plan: Not less than 10 days before the Pre-construction meeting, prepare and submit an Environmental Protection Plan.
1. Format: At a minimum, address the following elements:
   a. Identification of Project.
   b. Identification and contact information for Environmental Manager.
   c. General site information.
   d. Summary of Work.
   e. Procedures to address water resources.
   f. Procedures to address land resources.
   g. Procedures to address air resources.
   h. Procedures to address fish and wildlife resources.
   i. Monitoring procedures.

2. Revise and resubmit Plan as required by College's Representative.
   a. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.

B. Reports for Field Quality Control.

PART 2 - PRODUCTS
Not Applicable to this Section.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL PROTECTION

A. Protection of Natural Resources: Comply with applicable regulations and these specifications. Preserve the natural resources within the Project boundaries and outside the limits of permanent Work performed under this Contract in their existing condition or restore to an equivalent or improved condition as approved by College's Representative.

1. Demolition: Confine demolition and construction activities to work area limits indicated on the Drawings or, if not indicated, maximum 40 feet beyond the building perimeter, 10 feet beyond solid paving, and 25 feet beyond pervious paving. Dispose of demolished and waste materials that are not identified to be salvaged, recycled or reused in accordance with Section 01575 - Construction & Demolition (C&D) Waste Management and the following:
   a. Remove debris, rubbish, and other waste materials resulting from demolition and construction operations, from site.
   b. Do not burn construction and demolition waste.
   c. Transport materials with appropriate vehicles and dispose off-site to areas that are approved for disposal by governing authorities having jurisdiction.
   d. Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways. Remove spillage and sweep, wash, or otherwise clean project site, streets, or highways.

2. Water resources: Protect groundwater resources from contaminants.
   a. Comply with requirements of the National Pollutant Discharge Elimination System (NPDES) and the State Pollutant Discharge Elimination System (SPDES).
b. Oily substances: Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water.
   1) Store and service construction equipment at areas designated for collection of oil wastes.

c. Mosquito abatement: Prevent ponding of stagnant water conducive to mosquito breeding habitat.

d. Prevent run-off from site during demolition and construction operations.

3. Land resources: Prior to construction, identify land resources to be preserved within the Work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and landforms without permission from College's Representative.

a. Conserve distinctive geological features and character

b. Earthwork: As specified in Section 02300 - Earthwork and as follows:
   1) Erodible soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils, except where the constructed feature obscures borrow areas, quarries, and waste material areas. Clear areas in reasonably sized increments only as needed to use the areas developed. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.
   2) Delineate work zones so as to restrict compaction of soil elsewhere.
   3) Delineate buffer zones around naturally moist areas.
   4) Erosion and sedimentation control devices: Construct or install temporary and permanent erosion and sedimentation control features as required.

c. Tree and plant protection: Refer to Section 02231 - Tree Protection and Trimming.
   1) Prior to start of construction, tag each tree and plant scheduled to remain with value as approved by College's Representative. In the event of damage to tree or plant, College's Representative may at College's discretion, deduct the indicated value of the damaged tree or plant from the Contract Sum.

4. Air Resources: Comply with IAQ Management Plan and as follows:

a. Prevent creation of dust, air pollution, and odors.

b. Sequence construction to avoid disturbance to site to the greatest extent possible.

c. Use mulch, water sprinkling, temporary enclosures, and other appropriate methods to limit dust and dirt rising and scattering in air to lowest practical level.
   1) Do not use water when it may create hazardous or other adverse conditions such as flooding and pollution.

d. Store volatile liquids, including fuels and solvents, in closed containers.

e. Properly maintain equipment to reduce gaseous pollutant emissions.

5. Fish and Wildlife Resources: Manage and control construction activities to minimize interference with, disturbance of, and damage to fish and wildlife.

a. Do not disturb fish and wildlife.

b. Do not alter water flows or otherwise significantly disturb the native habitat related to the project and critical to the survival of fish and wildlife, except as indicated or specified.

c. Identify and conserve wildlife corridors that intersect the site.
3.2 FIELD QUALITY CONTROL

A. Field Quality Control, General:

1. Comply with requirements of agencies having jurisdiction and as specified herein.

2. Provide field practices, shipping, and handling of samples in accordance with ASTM D 4840.

B. Field Quality Control Reports: Provide in accordance with approved Environmental Protection Plan.

END OF SECTION
SECTION 01400
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-control requirements for individual construction activities are specified in the relevant Sections. Requirements in those Sections may also cover production of standard products.

2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.

3. Requirements for Contractor to provide quality-control services required by College, Construction Manager, Architect, or authorities having jurisdiction are not limited by provisions of this Section including DSA and relevant inspectors.

1.2 RELATED SECTIONS

A. Section 01320 - Project Schedule: Development schedule of required tests and inspections.

B. Section 01731 - Cutting and Patching: Repair and restoration of construction disturbed by testing and inspecting activities.

C. Divisions 2 through 16 Specifications Sections: Specific test and inspection requirements.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Architect or College.

C. Mockups: Full-size, physical example assemblies to illustrate finishes and materials. Mockups are used to verify selections made under Sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Mockups establish the standard by which the Work will be judged.

1. Install Field samples or mock-ups at the site as required by individual specifications Sections for review.
2. Acceptable samples represent a quality level for the work.

3. Remove field sample or mock up when specified in individual Sections.

D. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 REGULATORY REQUIREMENTS

A. Copies of Regulations: Obtain copies of the following regulations and retain at Project site to be available for reference by parties who have a reasonable need:


1.5 SUBMITTALS

A. Qualification Data: For testing agencies specified in Article titled "QUALITY ASSURANCE," herein, to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Qualifications for Continuous Inspection: When required by the Contract Documents or authorities having jurisdiction, engage inspectors registered and approved for "continuous inspection" by authorities having jurisdiction.

C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.

2. Description of test and inspection.

3. Identification of applicable standards.

4. Identification of test and inspection methods.

5. Number of tests and inspections required.

6. Time schedule or time span for tests and inspections.

7. Entity responsible for performing tests and inspections.

8. Requirements for obtaining samples.

9. Unique characteristics of each quality-control service.

D. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.

2. Project title and Architect's project number (indicated as "W.O. No." or "Job No." on the Drawings and Specifications; and DSA application number or other identifying number, if any.

3. Name, address, and telephone number of testing or inspecting agency.
4. Dates, times and locations of samples and tests or inspections.

5. Names of individuals making tests and inspections.

6. Description of the Work and test and inspection method.


8. Complete test or inspection data.

9. Test and inspection results and an interpretation of test results.

10. Ambient conditions at time of sample taking and testing and inspecting.

11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.

12. Name and signature of laboratory inspector.

13. Recommendations on retesting and re-inspecting.

14. In addition to items "1" through "5" above, include the following information in reports of continuous inspection:
   a. All information required by authorities having jurisdiction.
   b. Number of hours of inspection
   c. Summary of progress and condition of the Work.
   d. Observations of noncompliance with requirements of the Contract Documents, if any.
   e. Description of the Work observed.

E. Permits, Licenses, and Certificates: For Program Management Team's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. Any metal fabrication or welding procedures shall be performed by a certified fabrication shop.

B. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

C. Certified welders: All welders must be current in all relevant certifications for the project. Evidence of this certification must be provided and maintained.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
E. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.

F. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent. This individual will be maintained on laboratory staff, full-time.

G. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

   1. Requirement for specialists shall not supersede building codes and similar regulations governing the Work, nor interfere with local trade-union jurisdictional settlements and similar conventions.

H. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, currently approved by DSA, and that specializes in types of tests and inspections to be performed.

I. Preconstruction Testing: Testing agency shall perform preconstruction testing for compliance with specified requirements for performance and test methods.

   1. Contractor responsibilities include the following:

      a. Provide test specimens and assemblies representative of proposed materials and construction. Provide sizes and configurations of assemblies to adequately demonstrate capability of product to comply with performance requirements.

      b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.

      c. Fabricate and install test assemblies using installers who will perform the same tasks for Project.

      d. When testing is complete, remove assemblies; do not reuse materials on Project.

   2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, through Construction Manager with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

   1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.

   2. Notify Architect seven days in advance of dates and times when mockups will be constructed.

   3. Demonstrate the proposed range of aesthetic effects and workmanship.

   4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

6. Demolish and remove mockups when directed, unless otherwise indicated.

1.7 QUALITY CONTROL

A. Owner's Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services through the Program Management Team.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of the types of testing and inspecting they are engaged to perform.

2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract price will be adjusted by Change Order.

3. Reimburse Owner for costs of additional inspections and tests required due to any of the following:
   a. Contractor's failure to complete the entire Work within the contract time stated in the Agreement between Owner and Contractor, including properly authorized time extensions.
   b. Claims between separate contractors.
   c. Covering of Work before required inspections and tests are performed.
   d. Tests and inspections of Contractor's correction of defective Work.
   e. Inspecting and testing agency overtime costs due to acceleration of the Work for Contractor's convenience.
   f. Tests and inspections required because of a change in materials provided or a change in source of supply.
   g. Tests and inspections required solely for the convenience of the Contractor in scheduling and performing the Work.
   h. Inefficient inspection and testing caused by the Contractor's inefficient and sporadic manufacturing, purchasing or installation processes.

4. Regardless of the status or result of tests and inspections, promptly notify the Architect of observed irregularities or deficiencies in the Work or in products scheduled to be used in the Work.

B. Special Tests and Inspections: Owner will engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.

1. Testing agency will notify Construction Inspector, Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.

2. Testing agency will submit a certified written report of each test, inspection, and similar quality-control service to Construction Inspector and Architect with copy to Contractor and to authorities having jurisdiction.

3. Testing agency will submit a final report of special tests and inspections at Completion, which includes a list of unresolved deficiencies.
4. Testing agency will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

5. Testing agency will retest and re-inspect corrected work.

C. Manufacturer’s Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.

D. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor’s responsibility, provide quality-control services, including retesting and re-inspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.


1. Notify Construction Inspector Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.

2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.

3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.

4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.

5. Do not perform any duties of Contractor.

6. The agency is not authorized to stop the Work.

7. Select material samples for testing. Place a label, tag, or other permanent marker on samples for identification. Include the following information on the label as a minimum:
   a. Project name and address.
   b. Location in the Work from which the sample was removed or is scheduled to be placed.
   c. Date sample was taken.
   d. Nature of scheduled test or tests to be performed.

8. Perform testing and inspection services in compliance with requirements of authorities having jurisdiction.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.

2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.

4. Facilities for storage and field-curing of test samples.

5. Delivery of samples to testing agencies.

6. Preliminary design mix proposed for use for material mixes that require control by testing agency.

7. Security and protection for samples and for testing and inspecting equipment at Project site.

8. Furnish copies of mill test reports.

G. Coordination by Contractor: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, notification, and similar activities.

2. Notification: The Architect and Program Management Team may elect to attend some or all of the field tests and inspections. Notify the Architect and Program Management Team not less than 48 hours in advance of each field test and inspection, except notify the Architect and Program Management Team not less than 72 hours in advance of scheduled start-up of HVAC and electrical equipment, and when College facilities services department presence is required.

H. Architect and College reserve the right to require testing and inspection of any material or product used in the Work, including materials and products already installed.

I. Inspector of Record:

1. The College shall supply a DSA Project Inspector (PI) reporting to the Architect and the Division of the State Architect (DSA), who shall observe construction in progress. Inspectors shall have the following responsibilities and limitations on authority:

   a. PI performs duties as required in Title 24, Part 1 CCR.
   b. Observe installations and work in progress as a basis for determining conformance of the work, materials, and equipment with the Construction Documents. Project Inspector will report any discrepancies observed to the Architect’s assigned Construction Manager and the Contractor.
   c. Only the Architect of Record shall interpret the requirements of the Construction Documents. If any item is ambiguous, Architect of Record shall make a written interpretation. If Contractor requests changes or modifications to the Construction Documents, Architect of Record shall make a written determination on the requested changes or modifications.
   d. Prepare and submit an inspection report of all special inspections performed by the Contractor.
   e. Review the monthly progress payment request before Contractor submits it to the Architect and Construction Manager.
   f. Assist Architect of Record in reviewing the test and inspection results of testing laboratories.
g. The Project Inspector is not authorized to permit deviations from the requirements of the Contract Documents unless such deviations have been approved by Architect of Record, in writing.

h. The Project Inspector is not authorized to advise on or issue directions to Contractor about any aspect of construction means, methods, techniques, sequences, or procedures, or relating to safety programs in connection with the project.

2. Failure of the Construction Manager or Project Inspector to observe or inspect the Work, or to detect deficiencies in the Work, or to inform Contractor of any deficiencies which may be discovered, shall not relieve Contractor, their subcontractors regardless of tier, or suppliers from their responsibility for construction means, methods, techniques, sequences and procedures, construction safety, nor from their responsibilities to carry out the work in accordance with the Contract Documents and to detect and correct defective work. The term “defective work” means work that is unsatisfactory, faulty, omitted, incomplete, deficient, or does not conform to the requirements of the Contract Documents, project directives, or the requirements of any inspection, reference standard, test, or approval specified in the Contract Documents, or has been damaged prior to final completion, unless responsibility for the protection of such work has been assumed by the College through occupancy in accordance with the Contract General Conditions.

J. Inspection Requests:

1. Contractor shall request inspection of completed portions of the Work through the Construction Manager at least 2 working days in advance of the inspection to be performed. Contractor shall submit said request for inspection in writing using a form acceptable to the Construction Manager. The Contractor is responsible for reviewing all of the Contract Documents for inspection requirements.

2. Inspections which are to occur more than 50 miles from the project site (i.e., factory inspections, mill observations, etc.) require a minimum advance notice to the Construction Manager of 14 calendar days. All such inspections requiring the Project Inspector to travel shall be reimbursed by the Contractor.

K. Inspection Coordination:

1. Contractor shall provide, on a weekly basis, an anticipated Inspection Requirements Schedule, coordinated with the two-week, look-ahead schedule, showing the anticipated inspection needs for the upcoming three (3) weeks to facilitate appropriate campus coordination and interface as well as mobilization of required inspection staffing. The Contractor shall be solely responsible for any delays due to improper or untimely inspection requests.

2. Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the Inspector of Record. The Project Inspector, upon notification, shall make the requested inspections and shall either indicate in writing that that portion of the construction is satisfactory as completed or shall notify the Contractor that same fails to comply with plans and specifications. Any portions which do not comply shall be corrected by the Contractor and such portions shall not be covered or concealed until authorized by the Project Inspector.

   a. There shall be a final inspection and approval of all buildings, structures, and equipment when completed and ready for occupancy and use.
L. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within thirty (30) days of date established for the Notice to Proceed.

1. Distribution: Distribute schedule to Construction Manager, Project Inspector, Architect testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.8 TESTING AND INSPECTION REQUIREMENTS

A. The College will select an independent testing laboratory to conduct the tests. Selection of the material required to be tested shall be by the laboratory or the College’s representative and not by the Contractor.

B. The Contractor shall notify the College’s representative a sufficient time in advance of the manufacture of material to be supplied by him under the Contract. Documents, which test by terms of the Contract be tested, in order that the College may arrange for the testing of same at the source of supply.

C. Any material shipped by the Contractor from the source of supply prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from said representative that such testing and inspection will not be required shall not be incorporated in the job.

1.9 TESTS REPORTS

A. One copy of all test reports shall be forwarded to the Division of the State Architect by the testing agency. Such reports shall include all the 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 Title 24 and with the approved specifications. Test reports shall show the specified design strength. They shall also state definitely whether or not the material or materials tested comply with requirements.

1.10 VERIFICATION OF TEST REPORTS

A. Each testing agency shall submit to the Division of the State Architect a verified report in duplicate covering all the tests which are required to be made by that agency during the progress of the project. Such report shall be furnished each time that work on the project is suspended, covering the tests up to that time, and at the completion of the project, covering all tests.

1.11 INSPECTION BY THE OWNER

A. The College and his representatives 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.

1.12 TESTING AND INSPECTION

A. The College 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 College. If the Contractor does
not correct such rejected work within a reasonable time, fixed by written notice, the College may correct same and charge the expense to the Contractor.

B. Should it be considered necessary or advisable by the College at any time before final acceptance of the entire work to make an examination of the work already completed by removing or tearing out the same, the Contractor shall on request promptly furnish all necessary facilities, labor and materials. If such work is found to be defective in any respect due to the fault of the Contractor or his subcontractor, Contractor 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.

1.13 INSPECTOR - OWNER'S

A. An Inspector employed by the College in accordance with the requirements of the California Code of Regulations, Title 24, will be assigned to the work. His duties are specifically defined in 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.

1.14 INSPECTOR - OWNER - FIELD OFFICE

A. The Contractor shall provide for the use of the College's Inspector a temporary office to be located as directed by the Inspector and to be maintained until removal is authorized by the College. This office shall be compliant with Section 01500 - Temporary Facilities and Controls.

PART 2 - PRODUCTS

Not applicable to this Section

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Comply with the Contract Document requirements for Section 01731 - Cutting and Patching.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.
3.2 TESTS AND INSPECTION REQUIREMENTS

A. Concrete - CBC, Chapter 19A:

1. Materials:
   a. Portland Cement 1903 A.2, 1929 A.1
   b. Concrete Aggregates 1903 A.3
   c. Reinforcing Bars 1903 A.5, 1929 A.2

2. Quality:
   a. Proportions of Concrete 1904 A, 1905 A.1, A.2, A.3, A.4
   b. Strength Tests of Concrete 1905 A.6

3. Inspection:
   a. Job Site 1905 A.7
   b. Batch Plant 1929 A.4
   c. Waiver of Batch Plant 1929 A.5, A.6
   d. Reinforcing Bar Welding 1929 A.12

B. Steel - CBC, Chapter 22A:

1. Materials:
   a. Structural Steel, Cold Formed Steel 2202 A.1, 2231 A.1
   b. Identification 2203 A

2. Quality:
   a. Tests of Structural and Cold Formed Steel 2231 A.1
   b. Tests of High Strength Bolts, Nuts, Washers 2231 A.2
   c. Tests of End Welded Studs 2231 A.3
   d. Non Destructive Weld Tests 1703 A

3. Inspection:
   a. Shop Fabrication 2231 A.4
   b. Welding 2231 A.5
   c. Nelson Stud Welding 2231 A.5
   d. High Strength Bolt Installation 2231 A.6
D. Site Work. Demolition & Construction - CBC, Chapter 33 A:

1. Inspection:
   a. Excavations and Fills 3301 A.1

END OF SECTION
SECTION 01420

REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. General Conditions of the Contract: Additional terms applicable to the Contract.

1.2 DEFINITIONS OF TERMS

A. Basic Contract Definitions: Words and terms governing the Work are defined in the General Conditions of the Contract.

B. Words and Terms Used on Drawings and in Specifications: Additional words and terms may be used in the Drawings and Specifications and are defined as follows:

1. "Applicable:" As appropriate for the particular condition, circumstance or situation.

2. "Approve(d):" Approval action shall be limited to the duties and responsibilities of the party giving approval, as stated in the General Conditions of the Contract. Approvals shall be valid only if obtained in writing and shall not apply to matters regarding the means, methods, techniques, sequences and procedures of construction. Approval shall not relieve the Contractor from responsibility to fulfill Contract requirements.

3. "And/or:" If used, shall mean that either or both of the items so joined are required.

4. "Directed:" Limited to duties and responsibilities of the District Representative or Architect as stated in the General Conditions of the Contract, meaning "as instructed by the District Representative or Architect, in writing, regarding matters other than the means, methods, techniques, sequences and procedures of construction. Terms such as "directed", "requested", "authorized", "selected", "approved", "required", and "permitted" mean "directed by the District Representative or Architect", "requested by the District Representative or Architect", and similar phrases. No implied meaning shall be interpreted to extend the responsibility of the District Representative, Architect or other responsible design professional into the Contractor's supervision of construction.

5. "Equal" or "Equivalent:" As determined by Architect or other responsible design professional as being equivalent, considering such attributes as durability, finish, function, suitability, quality, utility, performance and aesthetic features.

6. "Furnish:" Means "supply and deliver, to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations."

7. "Indicated:" The term indicated refers to graphic representations, notes, or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as "shown", "noted", "scheduled", and "specified" are used to help the reader locate the reference. There is no limitation on location.

8. "Install:" Describes operations at the Project site including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations.
9. "Installer:"
   a. "Installer" refers to the Contractor or an entity engaged by the Contractor, as an employee, subcontractor, or sub-subcontractor for performance of a particular construction activity, including installation, erection, application and similar operations. Installers are required to be experienced in the operations they are engaged to perform.
   b. "Experienced Installer:" The term "experienced," when used with "installer" means having a minimum of 5 previous Projects similar in size to this Project, knowing the precautions necessary to perform the Work, and being familiar with requirements of authorities having jurisdiction over the Work.

10. "Jobsite:" Same as site.

11. "Necessary:" With due considerations of the conditions of the Project and as determined in the professional judgment of the Architect or other responsible design professional as being necessary for performance of the Work in conformance with the requirements of the Contract Documents, but excluding matters regarding the means, methods, techniques, sequences and procedures of construction.

12. "Noted:" Same as "Indicated."

13. "Per:" Same as "in accordance with," "according to" or "in compliance with."

14. "Products:" Material, system or equipment.

15. "Project Site:" Same as "Site."

16. "Proper:" As determined by the Architect or other responsible design professional as being proper for the Work, excluding matters regarding the means, methods, techniques, sequences and procedures of construction, which are solely the Contractor's responsibility to determine.

17. "Provide:" Means "furnish and install, complete and ready for the intended use."

18. "Regulation:" Includes laws, ordinances, statutes and lawful orders issued by authorities having jurisdiction, as well as and rules, conventions and agreements within the construction industry that control performance of the Work.

19. "Required:" Necessary for performance of the Work in conformance with the requirements of the Contract Documents, excluding matters regarding the means, methods, techniques, sequences and procedures of construction, such as:
   a. Regulatory requirements of authorities having jurisdiction.
   b. Requirements of referenced standards.
   c. Requirements generally recognized as accepted construction practices of the locale.
   d. Notes, schedules and graphic representations on the Drawings.
   e. Requirements specified or referenced in the Specifications.
   f. Duties and responsibilities stated in the Bidding and Contract Requirements.

20. "Scheduled:" Same as "Indicated."

21. "Selected:" As selected by the District Representative, Architect or other responsible design professional from the full selection of the manufacturer's products, unless specifically limited in the Contract Documents to a particular quality, color, texture or price range.
22. "Shown:" Same as "Indicated."

23. "Site:" Same as "Site of the Work" or "Project Site," the area or areas or spaces occupied by the Project and including adjacent areas and other related areas occupied or used by the Contractor for construction activities, either exclusively or with others performing other construction on the Project. The extent of the Project Site is shown on the Drawings, and may or may not be identical with the description of the land upon which the Project is to be built.


25. "Testing Laboratory" or "Testing Laboratories:" Same as "Testing and Inspection Agency."

26. "Testing and Inspection Agency:" An independent entity engaged to perform specific inspections or tests, at the Project Site or elsewhere, and to report on, and, if required, to interpret, results of those inspections or tests.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

1. Requirements for packaging, packing, marking, and preparation for shipment or delivery included in referenced federal specifications are not mandatory for products provided for this Work.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.

1. When a named or proposed product complies with a referenced standard of different publication date or issue than required by these Specifications, submit the product as a substitute under provisions of Section 01630 - Product Options and Substitutions. Provide a detailed written summary of changes in product or workmanship quality and performance as a result of the product complying with a different version of a standard from the version referenced.

C. Conflicting Requirements: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

D. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Where requirements conflict, provide the greater quantity and higher quality indicated. Refer uncertainties to Architect for a decision before proceeding.

E. Where a product is specified by both brand name and reference to 1 or more standards, provide that product only if it actually complies with the required standards. Listing of a product by brand or trade name in these Specifications is not a warranty that the product complies with the standards which may also be listed. If a named product does not comply with 1 or more of the required
standards and no alternative product is listed which does comply, submit a substitute product under provisions of Section 01630 - Product Options and Substitutions which complies with the required standards.

F. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

G. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source and make them available on request.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA  Aluminum Association, Inc. (The)
    www.aluminum.org
    703/358-2960

AAADM  American Association of Automatic Door Manufacturers
        www.aaadm.com
    216/241-7333

AABC  Associated Air Balance Council
       www.aabchq.com
    202/737-0202

AAMA  American Architectural Manufacturers Association
       www.aamanet.org
    847/303-5664

AASHTO  American Association of State Highway and Transportation Officials
         www.transportation.org
    202/624-5800

AATCC  American Association of Textile Chemists and Colorists (The)
       www.aatcc.org
    919/549-8141

ABAA  Air Barrier Association of America
       www.airbarrier.org
    866/956-5888

ABMA  American Bearing Manufacturers Association
       www.abma-dc.org
    202/367-1155

ACI  ACI International (American Concrete Institute)
     www.aci-int.org
    248/848-3700

ACPA  American Concrete Pipe Association
       www.concrete-pipe.org
    972/506-7216
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<th>Acronym</th>
<th>Association/Website</th>
<th>Contact Information</th>
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<tr>
<td>AEIC</td>
<td>Association of Edison Illuminating Companies, Inc. (The)</td>
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<td><a href="http://www.aeic.org">www.aeic.org</a></td>
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<tr>
<td>AF&amp;PA</td>
<td>American Forest &amp; Paper Association</td>
<td>800/878-8878</td>
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<td><a href="http://www.afandpa.org">www.afandpa.org</a></td>
<td>202/463-2700</td>
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<td>AGA</td>
<td>American Gas Association</td>
<td>202/824-7000</td>
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<td>AGC</td>
<td>Associated General Contractors of America (The)</td>
<td>703/548-3118</td>
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<td><a href="http://www.agc.org">www.agc.org</a></td>
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<td>AHA</td>
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<td>AHAM</td>
<td>Association of Home Appliance Manufacturers</td>
<td>859/288-4960</td>
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<td>Al</td>
<td>Asphalt Institute</td>
<td>800/242-3837</td>
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<td><a href="http://www.asphaltinstitute.org">www.asphaltinstitute.org</a></td>
<td>202/626-7300</td>
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<td>AIA</td>
<td>American Institute of Architects (The)</td>
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<td><a href="http://www.aia.org">www.aia.org</a></td>
<td>312/670-2400</td>
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<td>American Institute of Steel Construction</td>
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<td>AISI</td>
<td>American Iron and Steel Institute</td>
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<td><a href="http://www.steel.org">www.steel.org</a></td>
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<td>AITC</td>
<td>American Institute of Timber Construction</td>
<td>301/972-1700</td>
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<td>ALCA</td>
<td>Associated Landscape Contractors of America (Now PLANET - Professional Landscape Network)</td>
<td>847/394-0150</td>
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<td>ALSC</td>
<td>American Lumber Standard Committee, Incorporated</td>
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<td>AMCA</td>
<td>Air Movement and Control Association International, Inc.</td>
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<td>ANSI</td>
<td>American National Standards Institute</td>
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<td><a href="http://www.ansi.org">www.ansi.org</a></td>
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<td>AOSA</td>
<td>Association of Official Seed Analysts, Inc.</td>
<td>239/454-6989</td>
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<td><a href="http://www.aosaseed.com">www.aosaseed.com</a></td>
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<td>APA</td>
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| APA                  | APA - The Engineered Wood Association
                    | www.apawood.org      | 263/565-6600        |
| APA EWS              | APA - The Engineered Wood Association;
                    | Engineered Wood Systems
                    | (See APA - The Engineered Wood Association) |                       |
| API                  | American Petroleum Institute       | 202/682-8000        |
| ARI                  | Air-Conditioning & Refrigeration Institute
                    | www.ari.org           | 703/524-8800        |
| ARMA                 | Asphalt Roofing Manufacturers Association
                    | www.asphaltroofing.org | 202/207-0917        |
| ASCE                 | American Society of Civil Engineers
                    | www.asce.org           | 800/548-2723        |
| ASCE/SEI             | American Society of Civil Engineers/Structural Engineering Institute
                    | (See ASCE)            | 703/295-6300        |
| ASHRAE               | American Society of Heating, Refrigerating and
                    | Air-Conditioning Engineers
                    | www.ashrae.org        | 800/527-4723        |
| ASME                 | ASME International
                    | (The American Society of Mechanical Engineers International)
                    | www.asme.org           | 404/636-8400        |
| ASSE                 | American Society of Sanitary Engineering
                    | www.asse-plumbing.org | 800/843-2763        |
| ASTM                 | ASTM International
                    | (American Society for Testing and Materials International)
                    | www.astm.org           | 973/882-1170        |
| AWCI                 | AWCI International
                    | (Association of the Wall and Ceiling Industry International)
                    | www.awci.org           | 610/832-9585        |
| AWCMA                | American Window Covering Manufacturers Association
                    | (Now WCSC)            | 703/534-8300        |
| AWI                  | Architectural Woodwork Institute
                    | www.awinet.org         | 571/323-3636        |
| AWPA                 | American Wood-Preservers' Association
                    | www.awpa.com           | 205/733-4077        |
| AWS                  | American Welding Society
<pre><code>                | www.aws.org            | 800/443-9353        |
</code></pre>
<p>|                      |                                         | 305/443-9353         |</p>
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<th>Name</th>
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<td>AWWA</td>
<td>American Water Works Association</td>
<td>800/526-7337</td>
<td>303/794-7711</td>
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<td>BHMA</td>
<td>Builders Hardware Manufacturers Association</td>
<td>212/297-2122</td>
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<td>BIA</td>
<td>Brick Industry Association (The)</td>
<td>703/620-0010</td>
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<td>BICSI</td>
<td>BICSI</td>
<td>800/242-7405</td>
<td>813/979-1991</td>
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<td>BIFMA</td>
<td>BIFMA International (Business and Institutional Furniture Manufacturer's Association International)</td>
<td>616/285-3963</td>
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<td>BISSC</td>
<td>Baking Industry Sanitation Standards Committee</td>
<td>866/342-4772</td>
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<tr>
<td>CCC</td>
<td>Carpet Cushion Council</td>
<td>610/527-3880</td>
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<td>CDA</td>
<td>Copper Development Association</td>
<td>800/232-3282</td>
<td>212/251-7200</td>
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<td>CEA</td>
<td>Canadian Electricity Association</td>
<td>613/230-9263</td>
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<td>CFFA</td>
<td>Chemical Fabrics &amp; Film Association, Inc.</td>
<td>216/241-7333</td>
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<td>CGA</td>
<td>Compressed Gas Association</td>
<td>703/788-2700</td>
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<td>CIMA</td>
<td>Cellulose Insulation Manufacturers Association</td>
<td>888/881-2462</td>
<td>937/222-2462</td>
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<td>CISCA</td>
<td>Ceilings &amp; Interior Systems Construction Association</td>
<td>630/584-1919</td>
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<td>CISPI</td>
<td>Cast Iron Soil Pipe Institute</td>
<td>423/892-0137</td>
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<td>CLFMI</td>
<td>Chain Link Fence Manufacturers Institute</td>
<td>301/596-2583</td>
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<td>CRRC</td>
<td>Cool Roof Rating Council</td>
<td>866/465-2523</td>
<td>510/485-7175</td>
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<td>CPA</td>
<td>Composite Panel Association</td>
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<td>CPPA Corrugated Polyethylene Pipe Association</td>
<td>800/510-2772 202/462-9607</td>
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<td>CRI Carpet &amp; Rug Institute (The)</td>
<td>800/882-8846 706/278-3176</td>
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<td>CRSI Concrete Reinforcing Steel Institute</td>
<td>847/517-1200</td>
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<td>CSA Canadian Standards Association</td>
<td>800/463-6727</td>
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<td>CSA CSA International</td>
<td>866/797-4272 416/747-4000</td>
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<td>CSI Cast Stone Institute</td>
<td>717/272-3744</td>
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<tr>
<td>CSI Construction Specifications Institute</td>
<td>800/ (The) 689-2900 703/684-0300</td>
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<td>CSSB Cedar Shake &amp; Shingle Bureau</td>
<td>604/820-7700</td>
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<td>CTI Cooling Technology Institute</td>
<td>281/583-4087</td>
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<td>DHI Door and Hardware Institute</td>
<td>703/222-2010</td>
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<td>EIA Electronic Industries Alliance</td>
<td>703/907-7500</td>
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<td>EIMA EIFS Industry Members Association</td>
<td>800/294-3462 770/968-7945</td>
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<td>EJCDC Engineers Joint Contract Documents Committee</td>
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<td>EJMA Expansion Joint Manufacturers Association, Inc.</td>
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<td>FIBA Federation Internationale de Basketball</td>
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<td>FIVB</td>
<td>Federation Internationale de Volleyball (The International Volleyball Federation)</td>
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<td>FMRC</td>
<td>Factory Mutual Research (Now FM Global)</td>
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<td>Hollow Metal Manufacturers Association (Part of NAAMM)</td>
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<td>ICEA</td>
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<td>770/830-0369</td>
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<td>ICRI</td>
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<td>IEC</td>
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<td><a href="http://www.iec.ch">www.iec.ch</a></td>
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<td>IEEE</td>
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<td><a href="http://www.ieee.org">www.ieee.org</a></td>
<td>212/419-7900</td>
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<td>IESNA</td>
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<td><a href="http://www.iesna.org">www.iesna.org</a></td>
<td>212/248-5000</td>
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<td>IEST</td>
<td>Institute of Environmental Sciences and Engineering</td>
<td><a href="http://www.iest.org">www.iest.org</a></td>
<td>847/255-1561</td>
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<td>IGCC</td>
<td>Insulating Glass Certification Council</td>
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<td>IGMA</td>
<td>Insulating Glass Manufacturers Alliance</td>
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<td>613/233-1510</td>
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<td>ILI</td>
<td>Indiana Limestone Institute of America, Inc.</td>
<td><a href="http://www.ili.ai">www.ili.ai</a></td>
<td>812/275-4426</td>
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<td>International Organization for Standardization</td>
<td><a href="http://www.iso.ch">www.iso.ch</a></td>
<td>41 22 749 01 11</td>
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<td><a href="http://www.ansi.org">www.ansi.org</a></td>
<td>202/293-8020</td>
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<td>ISSFA</td>
<td>International Solid Surface Fabricators Association</td>
<td><a href="http://www.issfa.net">www.issfa.net</a></td>
<td>877/464-7732</td>
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<td>ITS</td>
<td>Intertek Testing Service NA</td>
<td><a href="http://www.intertek.com">www.intertek.com</a></td>
<td>702/567-8150</td>
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<td>ITU</td>
<td>International Telecommunication Union</td>
<td><a href="http://www.itu.int/home">www.itu.int/home</a></td>
<td>972/238-5591</td>
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<td>KCMA</td>
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<td><a href="http://www.kcma.org">www.kcma.org</a></td>
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<td>LMA</td>
<td>Laminating Materials Association</td>
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01420-10 REFERENCES
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<td>Maple Flooring Manufacturers Association, Inc.</td>
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<td>MH</td>
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<td>800/345-1815</td>
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<td>704/676-1190</td>
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<td>Marble Institute of America</td>
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<td><a href="http://www.marble-institute.com">www.marble-institute.com</a></td>
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<td>MPI</td>
<td>Master Painters Institute</td>
<td>888/674-8937</td>
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<td><a href="http://www.paintinfo.com">www.paintinfo.com</a></td>
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<td>MSS</td>
<td>Manufacturers Standardization Society of</td>
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<td></td>
<td>The Valve and Fittings Industry Inc.</td>
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<td><a href="http://www.miss-hq.com">www.miss-hq.com</a></td>
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<td>NAAMM</td>
<td>National Association of Architectural Metal Manufacturers</td>
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<td>NACE</td>
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<td>(National Association of Corrosion Engineers International)</td>
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<td>NADCA</td>
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<td>NAGWS</td>
<td>National Association for Girls and Women in Sport</td>
<td>800/213-7193, ext. 453</td>
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<td>NAIMA</td>
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<td>NBGQA</td>
<td>National Building Granite Quarries Association, Inc.</td>
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<td>NCAA</td>
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NCMA  National Concrete Masonry Association  703/713-1900
www.ncma.org

NCPI  National Clay Pipe Institute  262/248-9094
www.ncpi.org

NCTA  National Cable & Telecommunications Association  202/775-3550
www.ncta.com

NEBB  National Environmental Balancing Bureau  301/977-3698
www.nebb.org

NECA  National Electrical Contractors Association  301/657-3110
www.necanet.org

NeLMA  Northeastern Lumber Manufacturers' Association  207/829-6901
www.nelma.org

NEMA  National Electrical Manufacturers Association  703/841-3200
www.nema.org

NTA  InterNational Electrical Testing Association  888/300-6382
www.netaworld.org  303/697-8441

NFHS  National Federation of State High School Associations  317/972-6900
www.nfhs.org

NFPA  NFPA  800/344-3555
(National Fire Protection Association)  617/770-3000
www.nfpa.org

NFRC  National Fenestration Rating Council  301/589-1776
www.nfrc.org

NGA  National Glass Association  866/342-5642
www.glass.org  703/442-4890

NHLA  National Hardwood Lumber Association  800/933-0318
www.natlhardwood.org  901/377-1818

NLGA  National Lumber Grades Authority  604/524-2393
www.nlga.org

NOFMA  NOFMA: The Wood Flooring Manufacturers Association  901/526-5016
(Formerly: National Oak Flooring Manufacturers Association)
www.nofma.com

NRCA  National Roofing Contractors Association  800/323-9545
www.nrca.net  647/299-9070

NRMCA  National Ready Mixed Concrete Association  888/846-7622
www.nrmca.org  301/587-1400
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<td>800/673-6275</td>
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<td>NSSGA</td>
<td>National Stone, Sand &amp; Gravel Association</td>
<td>800/342-1415</td>
<td>703/525-8758</td>
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<td>National Terrazzo &amp; Mosaic Association, Inc. (The)</td>
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<td>540/751-0930</td>
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<td>Omega Point Laboratories, Inc. (Now ITS)</td>
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<td>PCI</td>
<td>Precast/Prestressed Concrete Institute</td>
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<td>PDCA</td>
<td>Painting &amp; Decorating Contractors of America</td>
<td>800/332-7322</td>
<td>314/514-7322</td>
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<td>PDI</td>
<td>Plumbing &amp; Drainage Institute</td>
<td>800/589-8956</td>
<td>978/557-0720</td>
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<td>PVC Geomembrane Institute</td>
<td>217/333-3929</td>
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<td>PLANET</td>
<td>Professional Landcare Network (Formerly: ACLA - Associated Landscape Contractors of America)</td>
<td>800/395-2522</td>
<td>703/736-8666</td>
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<td>Post-Tensioning Institute</td>
<td>602/870-7540</td>
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<td>RCSC</td>
<td>Research Council on Structural Connections</td>
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<td>Resilient Floor Covering Institute</td>
<td>301/340-8580</td>
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<td>Redwood Inspection Service</td>
<td>888/225-7339</td>
<td>415/382-0662</td>
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<td>Steel Door Institute</td>
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<td>SEFA</td>
<td>Scientific Equipment and Furniture Association</td>
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<td>SEI/ASCE</td>
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<td>SGCC</td>
<td>Safety Glazing Certification Council</td>
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<td>SIA</td>
<td>Security Industry Association</td>
<td>843/626-1995</td>
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<td>SIGMA</td>
<td>Sealed Insulating Glass Manufacturers Association (Now IGMA)</td>
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<td>SJI</td>
<td>Steel Joist Institute</td>
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<td>SMA</td>
<td>Screen Manufacturers Association</td>
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<td>SMACNA</td>
<td>Sheet Metal and Air Conditioning Contractors' National Association</td>
<td>800/523-6154</td>
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<td>SMPTE</td>
<td>Society of Motion Picture and Television Engineers</td>
<td>850/434-2611</td>
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<td>SPFA</td>
<td>Spray Polyurethane Foam Alliance (Formerly: SPI/SPPD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division)</td>
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<td>Single Ply Roofing Industry</td>
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<td>SSINA</td>
<td>Specially Steel Industry of North America</td>
<td>877/281-7772</td>
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<td>SSPC</td>
<td>SSPC: The Society for Protective Coatings</td>
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<td>Sealant, Waterproofing, &amp; Restoration Institute</td>
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<td>TCA</td>
<td>Tile Council of America, Inc.</td>
<td><a href="http://www.tileusa.com">www.tileusa.com</a></td>
<td>864/646-8453</td>
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<td>TIA/EIA</td>
<td>Telecommunications Industry Association/ Electronic Industries Alliance</td>
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<td>TMS</td>
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<td>Truss Plate Institute, Inc.</td>
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<td>UL</td>
<td>Underwriters Laboratories Inc.</td>
<td><a href="http://www.ul.com">www.ul.com</a></td>
<td>877/854-3577</td>
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<td>USAV</td>
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<td>888/786-5539</td>
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<td>USITT</td>
<td>United States Institute for Theatre Technology, Inc.</td>
<td><a href="http://www.usitt.org">www.usitt.org</a></td>
<td>800/938-7488</td>
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<td>WASTEC</td>
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<td>800/424-2869</td>
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<td>WCLIB</td>
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<td>WDMA</td>
<td>Window &amp; Door Manufacturers Association</td>
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<td>WI</td>
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<td>WMMPA</td>
<td>Wood Moulding &amp; Millwork Producers Association</td>
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<td>WSRCA</td>
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**B. Code Agencies:** Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

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<td>IAPMO</td>
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<td>ICBO</td>
<td>International Conference of Building Officials</td>
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<td>ICBO ES</td>
<td>ICBO Evaluation Service, Inc.</td>
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<td>SBCCI</td>
<td>Southern Building Code Congress International, Inc.</td>
<td>562/699-0543</td>
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<td>UBC</td>
<td>Uniform Building Code</td>
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C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

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<td>DOC</td>
<td>Department of Commerce</td>
<td><a href="http://www.commerce.gov">www.commerce.gov</a></td>
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<td>DOD</td>
<td>Department of Defense</td>
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<td>Department of Energy</td>
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<td>Food and Drug Administration</td>
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<td>General Services Administration</td>
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<td>NCHRP</td>
<td>National Cooperative Highway Research Program (See TRB)</td>
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<td>NIST</td>
<td>National Institute of Standards and Technology</td>
<td><a href="http://www.nist.gov">www.nist.gov</a></td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Safety &amp; Health Administration</td>
<td><a href="http://www.osha.gov">www.osha.gov</a></td>
</tr>
<tr>
<td>PBS</td>
<td>Public Building Service</td>
<td>(See GSA)</td>
</tr>
</tbody>
</table>
D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG Americans with Disabilities Act (ADA) 800/872-2253
Architectural Barriers Act (ABA) 202/272-0080
Accessibility Guidelines for Buildings and Facilities
Available from Access Board
www.access-board.gov

Available from Government Printing Office 202/512-1800
www.gpoaccess.gov/cfr/index.html

DOD Department of Defense Military Specifications and Standards 215/697-2664
Available from Department of Defense Single Stock Point
http://dodssp.daps.dla.mil

DSCC Defense Supply Center Columbus
(See FS)

FED-STD Federal Standard
(See FS)

FS Federal Specification 215/697-2664
Available from Department of Defense Single Stock Point
http://dodssp.daps.dla.mil

Available from Defense Standardization Program
www.dps.dla.mil

Available from General Services Administration
www.gsa.gov

01420-18 REFERENCES
FTMS Federal Test Method Standard  
(See FS)

MIL (See MILSPEC)

MIL-STD (See MILSPEC)

MILSPEC Military Specification and Standards  
Available from Department of Defense Single Stock Point 
http://dodssp.daps.dla.mil 

UFAS Uniform Federal Accessibility Standards  
Available from Access Board  
www.access-board.gov

E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CBHF State of California, Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation  
www.dca.ca.gov/bhti

CCR California Code of Regulations  
www.calregs.com

CPUC California Public Utilities Commission  
www.cpuc.ca.gov

DSA Division of the State Architect  
www.dsa.dgs.ca.gov

1.5 MISCELLANEOUS ABBREVIATIONS

A. Abbreviations: The following are commonly used abbreviations which may appear in the Project Manual. Refer to Construction Specifications Institute Document TD-2-4 "Abbreviations" for explanation of other abbreviations.
AC or ac  Alternating current or air conditioning (depending upon context)
AMP or amp  Ampere
C  Celsius
CFM or cfm  Cubic feet per minute
CM or cm  Centimeter
CY or cy  Cubic yard
DC or dc  Direct current
DEG or deg  Degrees
F  Fahrenheit
FPM or fpm  Feet per minute
FPS or fps  Feet per second
FT or ft  Foot or feet
Gal or gal  Gallons
GPM or gpm  Gallons per minute
HVAC  Heating, ventilating and air conditioning
IN or in  Inch or inches
Kip or kip  Thousand pounds
KSI or ksi  Thousand pounds per square inch
KSF or ksf  Thousand pounds per square foot
KV or kv  Kilovolt
KVA or kva  Kilovolt amperes
KW or kw  Kilowatt
KWH or kwh  Kilowatt hour
LBF or lbf  Pounds force
LF or lf  Lineal foot
M or m  Meter
MPH or mph  Miles per hour
MM or mm  Millimeter
PCF or pcf  Pounds per cubic foot
PSF or psf  Pounds per square foot
PSI or psi  Pounds per square inch
PSY or psy  Per square yard
SF or sf  Square foot
SY or sy  Square yard
V or v  Volts

B. Undefined Abbreviations, Acronyms, Names and Terms: Words and terms not otherwise specifically defined in this Section, in the Instructions to Bidders, in the General Conditions of the Contract, on the Drawings or elsewhere in the Specifications, shall be as customarily defined by trade or industry practice, by reference standard and by specialty dictionaries such as the following:


PART 2 - PRODUCTS

Not applicable to this Section
PART 3 - EXECUTION

Not applicable to this Section

END OF SECTION
SECTION 01500
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Requirements for temporary facilities and controls, including temporary utilities, support facilities, security and protection facilities, and traffic control.

B. Temporary utilities include, but are not limited to, the following:
   1. Sewers and drainage.
   2. Water service and distribution.
   3. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
   4. Heating and cooling facilities.
   5. Ventilation.
   6. Electric power service.
   7. Lighting.
   8. Telephone service.

C. Support facilities include, but are not limited to, the following:
   1. Temporary roads and paving.
   2. Dewatering facilities and drains.
   3. Project identification and temporary signs.
   5. Field offices for exclusive use of Construction Manager and Project Inspector.
   7. Storage and fabrication sheds.
   8. Lifts and hoists.
   10. Temporary stairs.
   11. Construction aids and miscellaneous services and facilities.

D. Security and protection facilities include, but are not limited to, the following:
   1. Environmental protection.
2. Storm water control.
3. Tree and plant protection.
4. Pest control.
5. Site enclosure fence.
7. Barricades, warning signs, and lights.
8. Covered walkways.
10. Temporary partitions.
11. Fire protection.

E. All equipment furnished by subcontractors shall comply with all requirements of pertinent safety regulations. The ladders, planks, hoists, and similar items normally furnished by the individual trades in execution of their own portions of the work are not part of this Section.

1.2 RELATED SECTIONS

A. Section 01330 - Submittal Procedures: Procedures for submitting copies of implementation and termination schedule and utility reports.

B. Section 01700 - Execution Requirements: Progress cleaning requirements.

C. Specifications in Divisions 2 through 16: Temporary heat, ventilation, and humidity requirements for Work specified in these Sections.

1.3 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weather-tight; exterior walls are insulated and weather-tight; and all openings are closed with permanent construction or substantial weather-tight temporary closures.

1.4 USE CHARGES

A. General: Cost or use charges for temporary facilities are not chargeable to District or Architect and shall be included in the Contract price. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:

1. District's construction forces.
2. Occupants of Project.
4. Testing agencies.
5. Personnel of authorities having jurisdiction.

B. Sewer Service: Pay sewer service use charges for sewer usage, by all parties engaged in construction, at Project site.
C. Water Service: Pay water service use charges, whether metered or otherwise, for water used by all entities engaged in construction activities at Project site.

D. Electric Power Service: Pay electric power service use charges, whether metered or otherwise, for electricity used by all entities engaged in construction activities at Project site.

1.5 SUBMITTALS

A. Temporary Utility Reports: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

B. Implementation and Termination Schedule: Within 15 days of date established for submittal of Contractor's Construction Schedule, submit a schedule indicating implementation and termination of each temporary utility.

C. Graphic Design: Submit drawings indicating graphic design for temporary project identification signs designed by the Contractor.

D. Contractor's Site Plan: Showing locations of temporary fencing, all proposed trailers and other temporary facilities (including trash dumpsters, for example) and temporary utility connections, for approval by District prior to installation.

1.6 QUALITY ASSURANCE


1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.

2. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with California Electrical Code.

B. Tests and Inspections: Arrange for District to test and inspect each temporary utility before use. Obtain required certifications and permits from Construction Manager.

1.7 PROJECT CONDITIONS

A. Temporary Utilities: At earliest feasible time, when acceptable to District, change over from use of temporary service to use of permanent service.

1. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before District acceptance, regardless of previously assigned responsibilities.

B. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:

1. Keep temporary services and facilities clean and neat.

2. Relocate temporary services and facilities as required by progress of the Work.

C. Security: Employ all measures necessary to ensure the security of the Project site. Security measures, if any, provided by the District do not relieve the Contractor from responsibility for site security as required by the Contract Documents.
PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended.

B. Gypsum Board: Minimum 1/2 inch thick by 48 inches wide by maximum available length; regular-type panels with tapered edges, unless otherwise indicated. Comply with ASTM C 36.

C. Paint: Comply with requirements in Division 9 Section "Painting."

D. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.

E. Water: Potable.

2.2 EQUIPMENT

A. General: Provide equipment suitable for use intended.

B. Field Offices: Mobile units with lockable entrances, operable windows, and serviceable finishes; heated and air conditioned; on foundations adequate for normal loading. Provide the following for job-built construction:

C. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

2. Comply with requirements of authorities having jurisdiction.

D. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

E. Heating Equipment: Unless Owner authorizes use of permanent heating system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited

2. Heating Units: Listed and labeled, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use for type of fuel being consumed.

F. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 11 0- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.

G. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 12S-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

H. First Aid Supplies: Provide types and quantities required by referenced standards, authorities having jurisdiction, and as prudent for the conditions existing for the Work.

PART 3 - EXECUTION
3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service as approved by the District’s Facilities Services Department. Provide matching, compatible materials and equipment.

1. Arrange with Construction Manager for time when service can be interrupted, if necessary, to make connections for temporary services.

2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.

B. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off-site in a lawful manner.

1. Filter out excessive soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.

2. Connect temporary sewers to private system indicated as directed by sewer department officials.

3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. After heavy use, restore normal conditions promptly.

4. For the DSA P.I.’s and Contractor’s trailers, where restrooms are included, provide a temporary holding tank under the trailer that shall be pumped/serviced a minimum of at least once per week.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction until permanent water service is in use. Sterilize temporary water piping before use.

1. Provide rubber hoses as necessary to serve Project site.

2. As soon as water is required at each level, extend service to form a temporary water- and fire protection standpipe. Provide distribution piping. Space outlets so water can be reached with a 100-foot hose. Provide one hose at each outlet.

3. Provide pumps to supply a minimum of 3D-psi static pressure at highest point. Equip pumps with surge and storage tanks and automatic controls to supply water uniformly at reasonable pressures.

4. Provide all connections and extensions required.

5. Maintain connections and extensions in a safe manner and utilize so as to not constitute a hazard to persons or property.

6. Connections and extensions will be subject to approval of District’s Facilities Services
Department. Immediately remove or remedy connections and extensions that represent safety hazards or cause undue interruption of District's normal operations.

7. Provide all drinking water.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.

1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.

2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Provide separate facilities for male and female personnel.

3. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled.
   a. Where required by authorities having jurisdiction or deemed necessary by the Contractor for health or safety reasons, provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.

4. Drinking-Water Fixtures: Install drinking-water fountains where indicated.
   a. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F.

5. Locate toilets and drinking-water fixtures so personnel need not walk more than two stories vertically or 200 feet horizontally to facilities.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed.

1. Maintain temperature as required in other Sections of these Specifications, but maintain a minimum temperature of 60 deg F in permanently enclosed portions of building for normal construction activities, and 65 deg F for finishing activities and areas where finished Work has been installed.

2. Provide temporary cooling for all electrical rooms and telephone/data rooms from the time power-up occurs until permanent cooling to each of these spaces is operational in compliance with the Contract Documents.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

G. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear.

1. Install electric power service underground, unless overhead service must be used.
2. Install power distribution wiring overhead and rise vertically where least exposed to damage.
   a. Provide distribution of temporary electric power service so that adequate power is available in a safe manner at any position within the Work without using an extension of more than 100 feet.

H. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.
   1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
   2. Provide 4-gang outlets, spaced so 100-foot extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac. 20-A circuit for each outlet.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations and traffic conditions.
   1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
   2. Provide illumination levels appropriate to task, but not less than 25 foot-candles (270 lux).
   3. Install exterior-yard site lighting that will provide adequate illumination for construction operations, traffic conditions, and signage visibility when the Work is being performed.

J. Telephone Service: Provide temporary telephone service throughout construction period for common-use facilities used by all personnel engaged in construction activities. Install separate telephone line for each field office and first-aid station.
   1. Provide additional telephone lines for the following:
      a. In field office with more than two occupants, install a telephone for each additional occupant.
      b. Provide a dedicated telephone line for each facsimile machine and computer with modem in each field office for the Contractor and the Architect.
      c. Provide a dedicated telephone line at each first aid station.
   2. At each telephone, post a list of important telephone numbers.
      a. Police and fire departments.
      b. Ambulance service.
      c. Contractor's home office.
      d. Architect's office.
      e. Engineers' offices.
      f. DSA's office.
      g. Principal subcontractors' field and home offices.
3. Provide an answering machine function on each telephone.

4. Contractor to provide own data lines through satellite vendor.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access, and as approved by the Program Management Team, Architect, and District Building Official.

2. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.

3. Maintain support facilities until near Completion. Remove before Completion. Personnel remaining after Completion will be permitted to use permanent facilities, under conditions acceptable to District Representative.

B. Traffic Controls: Provide temporary traffic controls at junction of temporary roads with District or public roads. Include warning signs for public traffic and "STOP" signs for entrance onto College or public roads. Comply with requirements of authorities having jurisdiction.

C. Dewatering Facilities and Drains: Comply with requirements in applicable Division 2 Sections for temporary drainage and dewatering facilities and operations not directly associated with construction activities included in individual Sections. Where feasible, use same facilities. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining property nor endanger permanent Work or temporary facilities.

2. Before connection and operation of permanent drainage piping system, provide temporary drainage where roofing or similar waterproof deck construction is completed.

3. Remove ice as required to minimize accumulations.

D. Project Identification and Temporary Signs: Prepare Project identification and other signs in sizes and design indicated, or if not indicated, as appropriate so that information may be read from the far side of adjoining road. Install signs where indicated and appropriate to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.

1. Engage an experienced sign painter to apply graphics for Project identification signs. Comply with details indicated.

2. Prepare temporary signs to provide directional information to construction personnel and visitors.

3. Construct signs of 3/4 inch thick exterior-type Grade B-8 high-density concrete form overlay plywood in sizes and thicknesses indicated. Support on posts or framing of preservative treated wood or steel.

4. Paint sign panel and applied graphics with exterior-grade alkyd gloss enamel over exterior primer. Letters and corporate logos shall be self-adhered die cut vinyl, to the College's design and colors.

5. Project sign shall be painted, multicolored plywood or metal, 8 feet wide x 6 feet high at a location designated by the District Representative. Artwork shall be scanned or enlarged as necessary by the Contractor, shall be provided by the project Architect.
6. Project sign shall list title of project, the name of the District, District Board of Trustees, the College, the Architect of Record, and the Contractor.

7. Project sign shall be erected on the site at a location designated by the District Representative.

8. The Contractor shall install the project identification sign within 30 days after Notice-to-Proceed.

9. Appropriate signage shall be posted by the Contractor at all site entrances to restrict unauthorized access. Off-site signage shall be placed on designated access routes to direct deliveries and related construction traffic to the job site. Location of signage shall be approved by the District Representative.

10. No other signs are allowed without the permission of District Representative, except those required by law.

E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with Section 01700 - Execution Requirements for progress clearing requirements.

1. If required by authorities having jurisdiction, provide separate containers, clearly labeled, for each type of waste material to be deposited.

2. Do not burn waste materials. Do not bury debris or excess materials on the District's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems or streams. Remove waste materials from the site and dispose of lawfully.

3. Where extra materials of value remain after completion of associated Work, they become the District's property. Dispose of these materials as directed by the District Representative.

4. Provide on-site containers for collection of waste materials, debris, and rubbish.

5. Handle waste materials in a controlled manner. Do not drop or throw materials from heights.

6. Develop a waste management plan for Work performed on Project. Indicate types of waste materials Project will produce and estimate quantities of each type. Provide detailed information for on-site waste storage and separation of recyclable materials. Provide information on destination of each type of waste material and means to be used to dispose of all waste materials.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near Project site. Provide measures, including regular watering, necessary to minimize air-borne dust.

1. Comply with regulations of authorities having jurisdiction.

B. Storm water Control: Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains. Refer to Division 2 Section “Site Clearing” for additional requirements regarding Storm Water Pollution
Prevention Plan.

C. Protection Against Inclement Weather: Brace, secure, and cover all parts of the Work to prevent damage by inclement weather.

D. Protect the Work from damage due to nuisance water such as rainwater, surface runoff, and irrigation water. Comply with requirements of authorities having jurisdiction regarding routing and disposal of nuisance water.

E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from construction damage. Protect tree root systems from damage, flooding, and erosion.

F. Pest Control: Before deep foundation work has been completed, retain a local exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests. Engage this pest-control service to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Completion. Obtain extended warranty for District. Perform control operations lawfully, using environmentally safe materials.

G. Protection and security measures required by authorities having jurisdiction are considered minimum requirements. Provide additional measures as necessary and appropriate to the hazards of this Project.

1. Protect work, existing premises, and the District’s operations from theft, vandalism, and unauthorized entry.

2. Initiate program in coordination with the College Administration, and the College Security at job mobilization, as directed by District Representative.

3. Maintain program throughout construction period until the District accepts the Work as complete or the need for security is eliminated as determined by the District Representative.

H. Site Enclosure Fence: Before construction operations begin, install 8-feet high chain-link enclosure fence with lockable entrance gates and green screen. Locate where indicated, or enclose entire Project site or portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering site except by entrance gates. Comply with regulations of authorities having jurisdiction.

1. Set fence posts in compacted mixture of gravel and earth.

2. Provide gates in sizes and at locations necessary to accommodate emergency vehicles, delivery vehicles and other construction operations.

3. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide District with one (1) set of keys.

4. Do not use portable fencing for Site Enclosure Fence.

5. Repair ground and landscape to original condition where fencing is removed.

I. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

J. Entry Control:

1. Contractor shall be responsible for project security at all times. If Contractor elects to
employ a private security guard, the guards shall first be cleared with the College Security Office and shall be the employee of a recognized Security Agency. No firearms will be permitted.

2. Restrict entrance of unauthorized persons and vehicles into Project site and existing facilities, buildings and or rooms during construction activities. All employees, subcontractors, deliveries and others under the direction or request of the Contractor shall check in with an Access Control Officer designated by the District. Badges will be worn at all times while on Project Site.

3. Contractor shall at all times permit District Representative, Engineer of Record, Architect of Record, Project Inspector, and others as identified by the College, access to the construction site.

4. Contractor shall be responsible for the care of all work until its completion and final acceptance; and they shall, at Contractors expense, replace damaged or lost material and repair damaged parts of the work, or the same may be done by the District and the Contractor and their sureties shall be liable therefore. The Contractor shall make their own provisions for properly storing and protecting all material and equipment against theft, injury, or damage from any and all causes. Damaged material and equipment shall not be used in the work. The Contractor shall take all risks from floods and casualties or for delays from such causes. The Contractor shall remove from the vicinity of the completed work all plant, buildings, rubbish, unused material, concrete forms, sheeting, or equipment belonging to them or used under their discretion during construction; and in the event of their failure to do so, the same may be removed by the District at the expense of the Contractor, and the Contractor and their sureties shall be liable therefore.

5. Contractor shall adopt all practical means to minimize interference to traffic and inconvenience, discomfort, or damage. The Contractor shall protect against injury, structures crossing trenching or encountered in the Work and shall be responsible for any injury done to such structures, or damage there from. Contractor shall support or replace any such structures without delay and without any additional compensation, to the entire satisfaction of the District Representative and/or Engineer of Record.

6. Obstructions to traffic shall be guarded by flag-persons as required and by barriers and illuminated at night. The Contractor shall be responsible for all damage to persons and property directly or indirectly caused by their operations, and under all circumstances they shall comply with the laws and regulations of the State of California, relative to safety of persons and property and the interruption of traffic and the convenience of the public within the respective jurisdiction, and shall be solely responsible for any damages caused by failure to provide proper safety.

7. Contractor will be held responsible for and be required to make restitution, at their own expense, for all damage to persons or property caused by the Contractor or subcontractor, or the agents, or employees of either during the progress of the Work and until its final acceptance.

8. Contractor shall immediately notify the College Security Department and the District Director of Facilities Services of any such injuries or damages caused directly or indirectly by their operations.

K. Security and Pass Requirements:

1. Contractor shall furnish laminated photo identification badges for all Contractor personnel working on this project

2. Contractor shall submit to the Construction Manager a list of individuals, including subcontractors, for whom identification badges have been issued. Any individual arriving at
the project site without a proper identification badge will not be permitted to enter the site.

3. Identification badges shall be assigned to an individual for the period of the Contract and cannot be interchanged between employees.

L. Barricades, Warning Signs, Signals, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.

1. Enclose excavations and openings with proper barricades.

2. Clearly identify hazards on and adjacent to the Project site. Maintain clearly visible and, if applicable, audible identification on a continuous 24-hour-per-day basis.

3. Illuminate barricades, warning signs, obstructions, and other hazards at night. Provide adequate light for clear visibility from sunset to sunrise.

4. Where appropriate, provide audible warning signals.

5. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch-thick exterior plywood.

M. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather tight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.

2. Vertical Openings: Close openings of 25 sq. ft. or less with plywood or similar materials.

3. Horizontal Openings: Close openings in floor or roof decks and horizontal surfaces with loadbearing, wood-framed construction.

4. Install tarpaulins securely using fire-retardant-treated wood framing and other materials.

5. Where temporary wood or plywood enclosure exceeds 100 sq. ft. in area, use fire-retardant treated material for framing and main sheathing.

N. Temporary Fire Protection' Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241 and requirements of authorities having jurisdiction.

1. Provide fire extinguishers, installed on walls on mounting brackets, visible and accessible from space being served, with sign mounted above.

   a. Field Offices: Class A stored-pressure water-type extinguishers.

   b. Other Locations: Class ABC dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for exposures.

   c. Locate fire extinguishers where convenient and effective for their intended purpose; provide not less than one extinguisher on each floor at or near each usable stairwell.
2. Store combustible materials in containers in fire-safe locations.

3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting. Prohibit smoking in hazardous fire exposure areas.

4. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

5. Permanent Fire Protection: At earliest feasible date in each area of Project, complete installation of permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

6. Develop and supervise an overall fire-prevention and first-aid fire-protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

7. Provide hoses for fire protection of sufficient length to reach construction areas. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

O. Protection and security measures required by authorities having jurisdiction are considered minimum requirements. Provide additional measures as necessary and appropriate to the hazards of this Project.

1. Protect work, existing premises, and the District's operations from theft, vandalism, and unauthorized entry.

2. Initiate program in coordination with the College Administration, and the Campus Security at job mobilization.

3. Maintain program throughout construction period until the District accepts the Work as complete or the need for security is eliminated as determined by the District Representative.

3.5 TRAFFIC CONTROL

A. Prior to start of Work, determine the routing of construction vehicles and the measures necessary to control traffic during construction. Provide measures including, but not limited to, the following:

1. Be responsible for controlling construction traffic on and adjacent to the site, including public right-of-ways. Comply with requirements of authorities having jurisdiction for traffic controls in public right-of-ways.

   a. Provide necessary measures including, but not limited to, flag personnel, barricades, sufficient lights, reflectors, warning signals, warning signs indicating closures, directional, and detour instructions.

   b. Comply with all traffic control schemes and restrictions that may be initiated by the Campus Securing, including ingress and egress to/from the public right of ways.

2. Route construction equipment, trucks, and similar vehicles via existing public streets to and from the site as approved by authorities having jurisdiction.

3. Obtain and pay for permits and inspections made necessary by use of public street, sidewalks, curbs, and paving. Post guarantees and bonds that may be required, and
repair subsequent damage to public property in a manner acceptable to authorities having jurisdiction.

4. Parking:

   a. No parking will be permitted on the District property. Contractor shall arrange for offsite parking and transportation. Contractor’s employees, subcontractors, and material suppliers shall observe all College traffic regulations.

   b. Contractor shall stage all delivery vehicles so as to not block traffic crosswalks, disabled access routes, fire lanes, building entrances, fire hydrants, and walkways.

3.6 OPERATION, TERMINATION, AND REMOVAL

   A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

   B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.

   1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

   2. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

   C. Temporary Facility Changeover: Except for using permanent fire protection as soon as available, do not change over from using temporary security and protection facilities to permanent facilities until Completion.

   D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

   1. Materials and facilities that constitute temporary facilities are the property of Contractor. District reserves right to take possession of Project identification signs.

   2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road all, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

   3. At Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Section 01770 - Closeout Procedures.

   4. After removal of temporary facilities which were placed on portions of the existing site not scheduled for new Work, restore those portions of the site occupied by the temporary facilities to at least the condition they existed prior to start of Work.

   E. Permanent Systems Used as Temporary Facilities: When a permanent building or site system, or portion thereof, is in a condition allowing operation as intended by the manufacturer and as required by
the Contract Documents, the permanent system or portion thereof may be used as a temporary facility unless indicated otherwise in the Contract Documents, provided the following conditions are satisfied by the Contractor:

1. Request and obtain written approval from the District Representative to use a specific permanent system or designated portion thereof as a temporary facility.

2. Assume full responsibility for the permanent system or portion thereof and clean, repair, or replace systems, or parts, damaged or soiled as a result of use as a temporary facility.

3. Pay all costs associated with using the system or portion thereof as a temporary facility including, but not limited to, operating costs, maintenance, repair, or replacement.

4. Operate the system under supervision of a person or persons qualified and knowledgeable about the proper operation of the system in accordance with the manufacturer's instructions.

END OF SECTION
SECTION 01575

CONSTRUCTION AND DEMOLITION (C&D) WASTE MANAGEMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section specifies requirements for the Contractor's implementation of waste management controls and systems for the duration of the Work. The intent is to develop and implement a waste management plan, quantifying material diversion by either weight or volume to recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.

B. This Section specifies requirements for Contractor's implementation of demolition and construction (C&D) waste management controls and systems for the duration of the Work.

1. The intent is to develop and implement a waste management plan, quantifying material diversion from landfill by either weight or volume to recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris, in order of preference 1) weight, 2) volume, whichever is most feasible to measure.

2. Provide contract documents, including C&D waste management plan, to show evidence of recycling, and reuse of recovered materials.

3. Inform College's Representative where C&D Waste Management requirements could detrimentally impact C&D schedule.

4. In Schedule of Values provide separate itemization of cost related to C&D Waste Management.

1.2 RELATED SECTIONS

A. Section 01310 - Project Management and Coordination.

B. Section 01330 - Submittal Procedures: General requirements for submittals.

C. Section 01354 - Noise and Acoustics Management.

D. Section 01355 - Environmental Management

E. Section 01500 - Temporary Facilities and Controls: Temporary barriers and controls.

F. Section 01700 - Execution Requirements: Cleaning requirements

G. Section 01770 - Closeout Procedures

1.3 REFERENCES


B. Local Integrated Waste Management Programs and Re-Use Programs in the Project area.

C. The Department of Toxic Substances Control (DTSC).
1.4 DEFINITIONS

A. Inert Fill: Permitted facility that accepts inert waste such as asphalt and concrete exclusively.

B. Class III Landfill: Landfill that accepts non-hazardous waste such as household, commercial, and industrial waste, including construction, remodeling, repair, and demolition operations.

C. Construction and Demolition Waste: Including solid wastes, such as building materials, packaging, rubbish, debris, and rubble resulting from construction, remodeling, repair, and demolition operations.

1. Rubbish: Including both combustible and noncombustible wastes, such as paper, boxes, glass, crockery, metal and lumber scrap, tin cans, and bones.

2. Debris: Including both combustible and noncombustible wastes, such as leaves and tree trimmings that result from construction or maintenance and repair work.

A. Weight Conversion Factor: It is the rate set forth in the Weight Conversion Factors published by The California Integrated Waste Management Board (CIWMB), for the use in estimating the volume or weight of materials identified in the C&D Waste Management Plan.

B. Deconstruction: Process of removing existing building materials from renovation and demolition projects for the purposes of reuse, and recycling, in an efficient and safe manner possible.

C. Divert: Using material for any purpose other than disposal in a landfill.

D. Waste Materials: Large and small pieces of listed materials which are excess to contract requirements and generally include materials to be recycled and/or recovered from existing construction and items of trimmings, cuttings, and damaged goods resulting from new installations, which can be effectively used in the Work.

E. Reuse: Using a material or product that is recovered from construction, renovation, or demolition activities.

F. Recycling: Process of collecting and preparing recyclable materials in their original form or in manufacturing processes that do not cause the destruction/contamination of recyclable materials in a manner that precludes further use.

G. Recovery: Any process that reclaims materials, substances, energy, or other products contained within or derived from waste on-site. It includes waste-to-energy, composting, and other processes.

H. Sources Separation: Sorting the recovered materials into specific material types with no or a minimum amount of contamination on site.

I. Time-Based Separation: Collecting waste during each phase of construction or deconstruction which results in primarily one major type of recovered material. The material is removed before it becomes mixed with the material from the next phase of construction.

J. Commingled or Off-site Separation: Collecting all material types into a single bin or mixed collection system and separating the waste materials into recyclable material types in an off-site facility.

1.6 CONSTRUCTION AND DEMOLITION (C&D) WASTE MANAGEMENT

A. Construction and Demolition (C&D) Waste Management Objective for the Project:

1. Factors that contribute to waste, such as over-packaging, improper storage, ordering error, poor planning, breakage, mishandling, and contamination shall be minimized

2. Of the inevitable waste that is generated, as much of the waste materials as economically feasible
shall be reused or recycled. Waste disposal in landfills shall be minimized.

3. Excavated soil and land-clearing debris do not contribute to this credit.

4. Incineration does not contribute to this credit.

5. Alternative Daily Cover (ADC) may contribute to this credit.

6. Reuse of existing concrete masonry or asphalt on-site shall include the weight of these materials in the calculations for this credit.

7. Wood Derived Fuel (WDF) may contribute to this credit.

B. Diversion From Landfill: Waste categories appropriate for diversion from landfill shall include, but not be limited to, the following:

1. Wood: Clean dimensional wood, palette wood.

2. Sheet Wood: Plywood, OSB and particle board.

3. Concrete and concrete washout waste.

4. Asphalt Concrete

5. Paper
   a. Bond
   b. Newsprint
   c. Cardboard

6. Metals
   a. Ferrous.
   b. Non-ferrous.

7. Paint.

8. Rigid Foam.

9. Glass.

10. Plastics

11. Carpet and pad

12. Beverage containers

13. Insulation

14. Gypsum Board

15. Porcelain Plumbing Fixtures

16. Fluorescent Light Tubes (per Dept. of Toxic Substances Control regulations).
1.7 SUBMITTALS

A. Construction and Demolition (C&D) Waste Estimate: Within 14 calendar days after receipt of Notice of Award, and prior to removal of any construction or demolition waste, whichever occurs sooner, Contractor shall prepare and submit to College's Representative a Construction Waste Estimate, using a Construction Waste Estimate form provided under separate cover, containing information as specified below under Article titled "Construction and Demolition (C&D) Waste Estimate".

B. Construction and Demolition (C&D) Waste Management Plan: Within 21 calendar days after receipt of Notice to Proceed and after acceptance by College's Representative of Construction Waste Estimate, Contractor shall submit plan containing information specified below under Article titled "Construction Waste Management Plan".

C. Construction and Demolition (C&D) Waste Management Progress Reports: Concurrent with each Application for Payment, Contractor shall prepare and submit Construction and Demolition (C&D) Waste Management Progress Reports as specified below in Article titled "Construction and Demolition (C&D) Waste Management Reports".

D. Waste and Demolition (C&D) Management Final Report: Prior to filing of Notice of Completion, Contractor shall prepare and submit written Construction and Demolition (C&D) Waste Management Final Report as specified below in Article titled "Construction and Demolition (C&D) Waste Management Reports".

E. Other Submittals:

1. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

2. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

3. 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.

4. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

5. Commingling Waste Vendor Submittals: Provide annual report from State Authority Having Jurisdiction (AHJ), including attached summary of diverted materials with average annual recycling rate. Figures in summary shall be derived from annual reports in concise clear language.

   a. Vendors shall demonstrate compliance with LEED CIR 12.2.05 (Commingled Waste).

   b. Provide tipping invoices for commingled waste and the following:

      (i) Vendor's most recent annual report from Authority Having Jurisdiction (AHJ).

      (ii) Vendor's annual report summary attachment of diverted materials in tonnage, with the average annual recycling rate.

   c. If Alternative Daily Cover (ADC) was listed as a diverted material in the above, vendors must demonstrate compliance with LEED CIR 5.17.02 (ADC), with letter from the landfill stating that ADC was received from vendor and that the same was actually used as cover, for the same year as the annual report.
d. If Wood Derived Fuel (WDF) was listed as a diverted material in the above, vendors shall demonstrate compliance with LEED CIR 2.6.07 (WDF), with letter from biomass plant stating their DOE operating permit number and that WDF was received from vendor, for the same year as the annual report.

6. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.8 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable regulations and policies of California Integrated Waste Management Board (CIWMB). A compendium of regulations and statutes is available at www.ciwmb.ca.gov/Publications.

B. Disposal Site, Recyclers and Waste Materials Processors: Use only facilities properly permitted by the State of California, and/or by local authorities where applicable.

1.9 CONFERENCES AND MEETINGS

A. Meetings:

1. Contractor shall conduct Construction and Demolition (C&D) Waste Management meetings with subcontractors who generate construction waste.


1.10 STORAGE AND HANDLING

A. Storage and Handling, General: In addition to requirements specified in Section 01600 - Product Requirements, comply with the following.

B. Site Storage:

1. Remove materials for recycling and recovery from the work locations to approved containers or storage area as required. Failure to remove waste or recovered materials will be considered cause for withholding payment and termination of Contract.

2. Position containers for recyclable and recoverable waste materials at a designated location on the Project Site. If materials are sorted on site, also provide a sorting area and necessary storage containers.

3. Change-out loaded containers for empty container, as demand requires.

4. If recovered materials are stored on-site for project duration provide adequate security from pilferage.

C. Handling:

1. Deposit indicated recyclable, and recoverable materials in storage areas or containers in a clean (no mud, adhesive, solvents, petroleum contamination), debris-free condition. Do not deposit contaminated materials into the containers until such time as such materials have been cleaned.

2. Ensure all recovered materials are made safe for handling and storage.
3. If the contamination chemically combines with the material so that it cannot be cleaned, do not deposit into the recycle containers. In such case, request resolution by the C&D Quality Manager for disposal of the contaminated material. Directions from the C&D Quality Manager do not relieve the Contractor of responsibility for compliance with all legal and regulatory requirements for disposal, nor shall such directions cause a request for modification of the Contract.

1.11 PROJECT CONDITIONS

A. Environmental Requirements:

1. Document site's existing natural, historical, and cultural features and make specific plans to preserve them. Coordinate with existing conditions documentation specified in Section 01100 Summary of Work.

2. Explain methods of protecting vegetation, such as designating access routes and parking.

3. Specify which areas of the site should be kept free of traffic, equipment, and storage.

4. Transport recyclable and recoverable waste materials from the Work Area to containers and carefully deposit in the containers without excess noise and interference with other activities, to minimize noise and dust.

5. Ensure adequate erosion control and storm water control, if required, to prevent or minimize the negative impact to its surrounding environment.

6. Provide measures to ensure containment of lead-based paint and dust, nails, asbestos-based products and any biological contaminants that may affect environmental health and safety conditions.

B. Site Conditions:

1. Signs and instructions should be clear, and easy to understand. All recycling containers should be clearly labeled and lists of acceptable and unacceptable materials will be posted throughout the site. Whenever possible, they should be in multiple-languages, especially in Spanish, and in graphic symbols.

2. Contractor shall ensure the safety of all personnel involved in the C&D process.

3. Prepare and submit C&D Site Management Plan that includes the following:
   a. Work areas.
   b. Materials processing areas.
   c. Materials storage and disposal areas.
   d. Toilet facilities, including worker hand-washing and changing stations.
   e. First aid.
   f. Fire and medical emergency contact information.
   g. Hazardous waste management.
PART 2 - PRODUCTS

Not applicable to this Section.

PART 3 - EXECUTION

3.1 CONSTRUCTION AND DEMOLITION (C&D) WASTE ESTIMATE

A. Construction and Demolition (C&D) Waste Estimate: Within 14 calendar days after receipt of Notice of Award, or prior to any waste removal, whichever occurs sooner, the Contractor shall submit to the College's Representative a Construction and Demolition (C&D) Waste Estimate, using a Construction Waste Estimate form provided under separate cover, containing the following information:

1. Estimate of total job site wastes to be generated, including material types and quantities.

2. Estimate of percentages of waste categories to landfill, to be reused, and to be recycled.

3.2 CONSTRUCTION & DEMOLITION (C&D) WASTE MANAGEMENT PLAN

A. Construction and Demolition (C&D) Waste Manager: Contractor shall designate on-site party (or parties) responsible for instructing workers and subcontractors, and overseeing and documenting results of C&D Waste Management for the Project.

B. Construction and Demolition (C&D) Waste Management:

1. Contractor shall be responsible for ensuring that construction and demolition debris is disposed of at appropriately designated licensed solid waste disposal facilities.

2. Contractor shall direct each Subcontractor to be responsible for segregating wastes into different disposal containers according to the Waste Management Plan.

C. Construction and Demolition (C&D) Waste Management Plan: With regard to goals for C&D waste management, Contractor shall develop, for review and acceptance by College's Representative, a Waste Management Plan specific for the Project. Plan shall contain the following at a minimum:

1. Analysis of the proposed jobsite C&D waste to be generated, including types and rough quantities. Indicate proposed methods to recover at least 75 percent of the C&D wastes for reuse and recycling.

2. Indicate compliance with requirements specified above in Article titled "QUALITY ASSURANCE".

3. Coordinate recovery efforts in C&D Waste Management Plan with Project construction schedule. Refer to Section 01320 - Project Schedule.

4. Include list of reuse facilities, recycling facilities and processing facilities that will be receiving recovered materials (including take-back by College or on-site auctions.).

5. If some materials will be donated or sold at on-site auctions, describe process and identify organizations that may receive materials.

6. Identify materials that are not recyclable or not recovered which will be disposed of in a landfill (or other means in compliance with applicable State of California and local ordinance and regulations) and explain why materials are not recovered.
7. List permitted landfill or other permitted disposal facilities that will be accepting disposed waste materials.

8. Indicate instances or situations where compliance with requirements specified in this Section do not apply or do not appear to be feasible.

9. Identify each type of waste material to be reused or recycled and estimate amount, by weight or volume.

10. Provide estimate of time requirements for demolition and for removal of valuable reusable items and materials.

11. Prepare building engineering survey and worker safety plan, assessment of building conditions and all potential hazards.

12. Provide final accounting of disposition of recovered materials upon completion of project for final payments.

13. Landfill Options: Name of landfills where trash and building debris will be disposed of, the applicable landfill tipping fees, and the projected cost of disposing of all Project waste in the landfills.

14. Landfill Certification: Contractor's statement of verification that landfills proposed for use are licensed for types of waste to be deposited and have sufficient capacity to receive waste from this project.

15. Alternatives to Landfilling: A list of each material proposed to be salvaged or recycled during the course of the Project. Include the following and any additional items proposed:

   a. Cardboard.

   b. Clean dimensional wood. If means of diversion is Wood Derived Fuel (WDF) refer to submittal requirements below.

   c. Beverage containers.

   d. Concrete.

   e. Slurry wall materials.

   f. Bricks and masonry.

   g. Asphalt.

   h. Metals from framing, banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.

   i. Mechanical and electrical equipment.

   j. Building components which can be removed relatively intact from existing construction.

   k. Packaging materials.

   l. Glass.

   m. Scraps from new gypsum wall board.
n. Carpet and cushion (pad).

o. Acoustical ceiling panels.

p. Plastics.

q. Vegetation.

16. Materials Handling Procedures: Description of means by which C&D waste materials identified above will be protected from contamination, and description of means to be employed in recycling above materials consistent with requirements for acceptance by designated facilities.

17. Transportation: Description of means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site) and destination of materials.

D. Distribution: Contractor shall distribute copies of the Construction and Demolition (C&D) Waste Estimate and Construction and Demolition (C&D) Waste Management Report forms to the Job Site Foreman, each Subcontractor, College’s Representative and Project Inspector.

E. Materials Handling Procedures: Provide means by which waste materials will be protected from contamination and means to be employed in reuse or recycling of waste material consistent with requirements for acceptance by receiving facilities.

1. Hazardous Wastes: Hazardous wastes shall be separated, stored, and disposed of according to local regulations, and in accordance with specifications for such work as may be included in this Project.

2. Instruction: Contractor shall provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at appropriate stages of the Project.

3.3 CONSTRUCTION AND DEMOLITION (C&D) WASTE MANAGEMENT REPORTS

A. Construction and Demolition (C&D) Waste Management Progress Reports: Concurrent with each Application for Payment, Contractor shall prepare and submit a written Waste Management Progress Report in the same format as required for Final Report. Attach delivery receipts for recovered materials and waste materials sent to the permitted recycling facilities, processing facilities or landfill with the following information:

1. Name of firm accepting the recovered materials or waste materials.

2. Specify type of facility (e.g. retail facility, recycler, processor, Class III landfill, MRF).

3. Location of the facility.

4. Type of materials.

5. Net weights (or volume) of each type of material.

6. Date of delivery.

7. Value of the materials or tipping fee paid.

C. Construction and Demolition (C&D) Final Waste Management Report: Upon completion of Work, including final cleanup, prepare and submit Final Waste Management Report. Develop and use C&D Waste Management Report Form in electronic (spreadsheet) format, using software as acceptable to College's Representative. Include the following:

1. Total quantity of each waste material generated and date(s) removed from job-site.
2. Percent of total quantity generated of each material sent to landfill, identity of the landfill (receiving facility), handling costs, transport costs, tipping fees paid at landfill and total landfill costs. Attach copies of manifests, weight tickets, receipts, and invoices.
3. For each material reused or recycled from the Project, include percent of total quantity generated, identity of receiving facility, total costs of handling and transportation and income. Attach manifests, weight tickets, receipts, and invoices.

3.4 C&D WASTE MANAGEMENT PLAN IMPLEMENTATION

A. C&D Waste Management Plan Implementation, General: Implement approved C&D Waste Management Plan. Provide handling, containers, storage, signage, transportation and other items as necessary to implement waste management plan during the entire duration of the Contract.

1. Coordinate with requirements specified in Section 01740 - Cleaning Requirements for progress cleaning, Substantial Completion cleaning and cleaning for final acceptance.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Coordinate with requirements specified in Section 01560 - Temporary Barriers and Enclosures for controlling dust and dirt, environmental protection, and noise control.

3.5 RECYCLING, SALVAGE AND RE-USE

A. Recycling, Salvage and Re-Use: Waste Material management shall be implemented in priority as reuse on-site, recycle on-site, reuse off-site, and recycle off-site. Other innovative approaches to achieve the minimum diversion rate are encouraged and should be specified and described in the C&D Waste Management Plan. Minimum diversion rate may be achieved by recovering and recycling the following materials for salvage or re-use:
1. Asphalctic concrete (a.c.).
2. Concrete and concrete blocks.
4. Ferrous metal.
5. Non-ferrous metals: Copper, aluminum, brass and bronze.
6. Untreated lumber.
7. Plywood, OSB, wood fiber board and wood particle board.
8. Gypsum wallboard scrap
11. Insulation, batt.
12. Insulation, rigid foam.
14. Carpet and pad and carpet tile.
15. Plumbing fixtures.
17. Doors.
18. Cabinets and casework.
19. Architectural fixtures.
20. Millwork, paneling and other similar interior finishes.
21. Electric fixtures, motors, switch gear and other similar equipment.
22. HVAC equipment, duck work, control systems, switches and other similar equipment.
23. Other materials as appropriate.

B. Recycling, General: Establish and carry out recycling program utilizing one or combination of any of the following common waste diversion strategies:

1. Sources Separation.
2. Time-Based Separation.
3. On-site Separation, Commingled or Off-site Separation.
5. On-site sales auctions and removal.

C. Recycling Incentives: Revenues from recycling waste materials shall accrue to Contractor. Rebates, tax credits, and other incentives received for recycling waste materials shall accrue to College.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site.
   a. List acceptable and unacceptable materials at each container and bin.
   b. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.

4. Store components off the ground and protect from the weather.

5. Remove recyclable waste off College's property and transport to recycling receiver or processor.

E. Wood Collected for Reuse: Sorted by the following.

   1. Type.
   2. Size, dimension.
   3. Protected from the ground, bending, and moisture.

F. Salvaged Items for Reuse in the Work:

   1. Clean salvaged items.
   2. Pack or crate items after cleaning. Identify contents of containers.
   3. Store items in a secure area until installation.
   4. Protect items from damage during transport and storage.
   5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

G. Salvaged Items for Sale: Not permitted on Project site.

H. Salvaged Items for College's Use:

   1. Clean salvaged items.
   2. Pack or crate items after cleaning. Identify contents of containers.
   3. Store items in a secure area until delivery to College.
4. Transport items to College’s storage area off site, as directed by College’s Representative.

5. Protect items from damage during transport and storage.

3.6 DISPOSAL OF SPECIFIC CONSTRUCTION AND DEMOLITION (C&D) WASTE

A. Beverage Containers: Used by on-site workers, redeemed at recycling center.

B. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.


3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site.

4. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.

5. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

C. Vegetation: Including branches and trunks shrubs and trees. Coordinate with requirements specified in Section 02231 - Tree Protection and Trimming.

1. Chip brush, branches, and trees on-site.

2. Comply with requirements specified in Section 02930 - Plants for use of chipped organic waste as organic mulch.

D. Asphaltic Concrete Paving: Grind asphalt to maximum 1-1/2-inch (38-mm) size.

1. Crush asphaltic concrete paving and screen to comply with requirements for use as general fill, as specified in Section 02300 - Earthwork.

E. Portland Cement Concrete:

1. Remove reinforcement and other metals from concrete and sort with other metals.

2. Pulverize concrete to maximum 1-1/2-inch (38-mm) size.

3. Crush concrete and screen for use as general fill or subbase for pedestrian paving, complying with requirements specified in Section 02300 - Earthwork.

4. Manage or have special vendor manage diversion of concrete washout wastes.

F. Masonry:

1. Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

2. Clean and stack undamaged, whole masonry units on wood pallets for recycling 011 site.
3. Pulverize broken or partial masonry units to maximum 1-1/2-inch (38-mm) size, for use on site.

4. Crush masonry and screen for use as general fill, complying with requirements specified in Section 02300 - Earthwork.

G. Lumber and Construction Panels: Sort and stack wood framing and construction panels according to type and size. Separate lumber, engineered wood products, panel products (plywood and wood fiber board) and treated wood materials.

1. Clean Cut-Oils: Grind or chip into small pieces.

2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
   a. Comply with requirements specified in Section 02930 - Plants for use of clean sawdust as organic mulch.

H. Metals: Separate metals by type.

1. Structural Steel: Sort and stack members according to type of member, size and length.

2. Remove and sort dispose of bolts, nuts, washers and other rough hardware according to metal type.

I. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

J. Plumbing Fixtures: Separate by type and size.

K. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

L. Conduit: Reduce conduit to straight lengths and store by type and size.

3.7 DISPOSAL OF CONSTRUCTION AND DEMOLITION (C&D) WASTE

A. Disposal of Construction and Demolition (C&D) Waste: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off College's property and dispose of materials legally in Class III Landfill.

END OF SECTION
SECTION 01600
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Administrative and procedural requirements: Selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties.

1.2 RELATED SECTIONS

A. Section 01420 - References: Applicable industry standards for products specified.

B. Section 01630 - Product Options and Substitutions: Product options and requirements for substitute products.

C. Section 01770 - Closeout Procedures: Submission of warranties for contract closeout.

D. Divisions 2 through 16 Sections: Specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature, which is current as of date of the Contract Documents.

2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.

3. Equal Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product. The Architect will be the sole judge of equality. Request for review by Architect of Equal Products will only be entertained during the bid period in accordance with the General Conditions of the Contract.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents, as proposed by Contractor. The District is not obligated to entertain substitutions. Request for review by Architect of substitutions will only be entertained during the bid period in accordance with the General Conditions of the Contract.

1. The District is not obligated to entertain substitution requests other than during the bid period in accordance with the General Conditions of the Contract. After the bid period, substitutions will be entertained only in the event that the Contractor can prove that the specified product
is no longer available. Failure to order a product in time for delivery to meet the construction schedule does not constitute unavailability of the product.

C. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to District.

D. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for District.

1.4 SUBMITTALS

A. Product List: Submit a list, in tabular form, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.

1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.

2. Form: Tabulate information for each product under the following column headings:

   a. Specification Section number and title.
   b. Generic name used in the Contract Documents.
   c. Proprietary name, model number, and similar designations.
   d. Manufacturer's name and address.
   e. Supplier's name and address.
   f. Installer's name and address.
   g. Projected delivery date or time span of delivery period.
   h. Identification of items that require early submittal approval for scheduled delivery date.

3. When requested by the Architect, submit 2 original copies of manufacturer's written specifications and instructions for each product proposed for the Work.

4. Completed List: Within 15 days after date of commencement of the Work, submit 3 copies of completed product list.

5. Architect's Action: Architect will respond in writing to Contractor within 15 days of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement that products comply with the Contract Documents.

B. Submission of Substitution Requests and Requests for Equal Products: As specified in Section 01630 - Product Options and Substitutions.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
PART 2 - PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENTS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.

3. District reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

4. Where products are accompanied by the term "as selected," Architect will make selection.

5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.


7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with requirements specified in Section 01630 - Product Options and Substitutions to obtain approval for use of an unnamed product.

B. Product Selection Procedures: Procedures for product selection include the following:

1. Available Products: Where Specification paragraphs or subparagraphs introduce a list of names of products, provide one of the products listed or another product that complies with requirements. Comply with requirements specified in Section 01630 - Product Options and Substitutions to obtain approval for use of an unnamed product.

2. Available Manufacturers: Where Specification paragraphs or subparagraphs introduce a list of manufacturers' names, provide a product by one of the manufacturers listed or another manufacturer that complies with requirements. Comply with requirements specified in Section 01630 - Product Options and Substitutions to obtain approval for use of an unnamed product.

3. Product Options: Where Specification paragraphs indicate that size, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide either the specific product or system indicated or an equal product or system by another manufacturer. Comply with requirements specified in Section 01630 - Product Options and Substitutions.

4. Visual Matching Specification: Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches satisfactorily.

   a. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.
5. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.

a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.

b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

c. Custom Range: Where Specifications include the phrase "custom colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes custom items in addition to both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS AND EQUAL PRODUCTS

A. Product Substitutions: Comply with requirements specified in Section 01630 - Product Options and Substitutions.

B. Equal Products: Comply with requirements specified in Section 01630 - Product Options and Substitutions.

PART 3 - EXECUTION

Not applicable to this Section.

END OF SECTION
SPECIAL WARRANTY

When required in Sections of the Specifications, Special Warranties shall be in the following form and written on Contractor's own letterhead:

"Warrant ____________________________________________

(portion of work warranted)

Project: ________________________________________________

Address: _______________________________________________

Date: ___________________________________________________

We, the undersigned hereby warrant that the ____________________________ which we have installed in the ____________________________ Project has been performed in accordance with the Contract Documents and that the work, as installed, will fulfill the requirements of the warranty included in this Specification. We agree to repair or replace any or all of our work, together with any other work which may be damaged or displaced by so doing, that may prove to be defective in its workmanship, materials, operation, or failure to conform to Contract provisions and requirements within a period of ___ year(s) from date of Final Completion of the above-named structure, without any expense whatever to the said District, ordinary wear and tear and unusual abuse or neglect excepted. In the event of our failure to comply with the above-mentioned conditions within thirty (30) calendar days after being notified in writing by the District, we collectively or separately do hereby authorize the District to proceed to have said defects repaired and made good at our expense, including all collection cost and reasonable attorney fees, and we will honor and pay the costs and charges therefore upon demand."

WARRANTY PERIOD: ____________ STARTING: ____________ TERMINATING ____________

Name of General Contractor ____________________________ Name of Subcontractor ____________________________

Signature of General Contractor ____________________________ Signature of Subcontractor ____________________________

Address ____________________________ Address ____________________________

Phone Number ____________________________ Phone Number ____________________________

State License Number ____________________________ State License Number ____________________________

Name of Manufacturer ____________________________ Manufacturer's Phone Number ____________________________

Signature of Manufacturer ____________________________

END OF SPECIAL WARRANTY FORM
SECTION 01630
PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section establishes procedures for specified product options and the submittal of substitutions by Contractors.

B. The intent of this section is to insure that specified product options and proposed substitutions exceed or equal the quality of the specified products and are furnished and installed in accordance with the design intent.

1.2 RELATED DOCUMENTS AND SECTIONS

A. General Conditions of the Contract and Supplementary Conditions of the Contract.

B. Section 01250 - Contract Modifications.

C. Section 01330 - Submittal Procedures.

1.3 PRODUCT OPTIONS

A. Where product options are included in the specifications sections and are specified by naming more than one, or several acceptable products or manufacturers, select any product or manufacturer listed.

B. For items specified only by Reference Standards, select any item meeting standards.

C. For items specified by performance requirements, select any item meeting performance standards specified.

D. Submit request, as required for substitution, for any item or manufacturer not specifically named not later than ten (10) days prior to date of bid opening.

1.4 SUBSTITUTIONS

A. Comply with provisions of Article 55. Substitutions For Specified Items in the General Conditions and modifications to this article provided in the Supplementary Conditions for compliance with AB 2084 amendments to Public Contract Code Sec. 2 Section 3400, effective January 1, 1999.

B. Should the Contractor wish to substitute an item he considers equal to the one specified, submit to Architect not later than ten (10) days prior to the date for bid opening, the name of the manufacturer, the model number, and other pertinent data and information regarding the "or equal" item which has been proposed and which the Contractor is seeking approval to incorporate in the work. If the "or equal" item is not found by the Architect to be, in fact, equal or superior in the opinion of the Architect, the Contractor shall furnish the item as set forth in the Specifications. Substitution requests submitted later than ten (10) days from the date of bid opening will not be considered and will be returned unreviewed.
C. To aid in the review of substitution requests, submit two copies of form (Example "A" - Substitution Request Form) following this Section.

D. Tabulate products by specification section number and title.

E. Submit separate request for each substitution. Support each request with:

1. Complete data substantiating compliance of proposed substitution with requirements stated in Contract Documents:
   a. Product identification, including manufacturer's name and address.
   b. Manufacturer's literature; identify;
      1) Product description.
      2) Reference standards.
      3) Performance and test data.
   c. Samples, as applicable.
   d. Name and address of similar projects on which product has been used, and date of each installation.

2. Itemized comparison of the proposed substitution with product specified; list significant variations.

3. Any effect the substitution may have on other trade contracts.

4. List of changes required in other work or products.

5. Accurate cost data comparing proposed substitution with product specified.
   a. Amount of any change in cost.

6. Designation of required license fees or royalties.

7. Designation of availability of maintenance services, sources of replacement materials.

F. Substitutions will not be considered for acceptance when:

1. They are indicated or implied on shop drawings or product data submittals without a formal request from Contractor and acceptance by District and Architect prior to bid.

2. They are requested after the project has bid.

3. They are requested after the Contract has been executed.

4. Acceptance will require structural changes or substantial revision of Contract Documents.

5. Substitution request procedures included in this Section and in the General and Supplementary Conditions of the Contract are not complied with by the Contractor.

6. They require review and acceptance of the Substitution by the Division of the State Architect (DSA).

G. Substitute products shall not be bid without written acceptance of the District and Architect.
H. District and Architect will determine acceptability of proposed substitutions prior to bid.

1.5 CONTRACTOR'S SUBSTITUTION CERTIFICATION

A. In making formal request for substitution contractor certifies that:

1. He has investigated proposed product and has determined that it is equal to or superior in all respects to that specified.

2. He will provide same warranties or bonds for substitution as for product specified.

3. He will provide same warranties or bonds for substitution into the work, and will make such changes as may be required for the work to be complete in all respects.

4. He waives claims for additional costs caused by substitution which may subsequently become apparent.

1.6 ARCHITECT'S DUTIES

A. Review Contractor's request for substitutions with reasonable promptness and issue a written response not later than 72 hours prior to bid.

B. Notify Contractor, in writing, of decision to accept or reject requested substitution.

1.7 SEPARATE SUBSTITUTE BIDS

A. Bidders may, if relevant, submit separate substitute bids using materials other than those described in these Contract Documents, provided that all substitutions are clearly identified and described and that the bid is in all other respects in accordance with the provisions of the Contract Documents.

1.8 AVAILABILITY OF SPECIFIED ITEMS

A. Verify prior to bidding that all specified and substituted items will be available in time for installation during orderly and timely progress of the work.

B. In the event specified items will not be available, notify the Architect prior to receipt of bids.

C. Cost of delays because of non-availability of specified items, when such delays could have been avoided by the Contractor, will be back-charged as necessary and shall not be borne by the District or Architect.

1.9 SUBSTITUTION WARRANTY REQUIREMENTS

A. Submit with the substitution request an executed Substitution Warranty. The Form at the end of this Section. This form shall apply to substitutions submitted for review prior to bid.

B. The Contractor shall warrant, in writing, that the substituted items are to perform as specified, and assume complete responsibility for the same. This includes responsibility and costs required for modifications to building, other materials, or equipment, and any additional coordination with work of other trades. Testing, of Substitutions proposed, if required or requested by the District Representative or Architect shall be paid by the Contractor.
C. Sample test of SUBSTITUTION WARRANTY is provided at the end of this Section, identified as Example "B".

PART 2 - PRODUCTS

Not applicable to this Section

PART 3 - EXECUTION

Not applicable to this Section

END OF SECTION
RIO HONDO COLLEGE
FITNESS CENTER MECHANICAL UPGRADE

SUBSTITUTION REQUEST #:  

Date:  

From:  


To:  


References:  Drawing(s)  Spec Section(s)  Other  

Disciplines Impacted:  [ ] Architectural  [ ] Structural  [ ] Mechanical  [ ] Electrical  [ ] Civil  [ ] Landscape  [ ]  

By submitting substitution, Contractor stipulates the following statements are correct:

1. Proposed substitution does not alter dimensions or dimensional relationships shown on drawings.
2. All costs to the Architect resulting from this substitution will be compensated.
3. Proposed substitution will not adversely impact schedule or coordination of work specified in other Sections.
4. Proposed substitution will not adversely impact warranty requirements.
5. Proposed substitution will not adversely impact availability of service, maintenance or replacement parts.

Summary of Proposed Substitution:


Comparative Analysis to specified item:  [ ] Attached  [ ] Under separate cover

If Substitution Request is accepted, there will be:

Possible Cost Impact  [ ] Increase  [ ] Decrease  [ ] No Change
Possible Time Impact  [ ] Increase  [ ] Decrease  [ ] No Change

Action on this Substitution Request is requested as soon [ ] PRIORITY ATTENTION as possible, but no later than ______________ REQUIRED

Copies to:  [ ] District Representative  [ ] Architect  [ ] Contractor

Architect's Response:

[ ] Accepted  [ ] Accepted as noted  [ ] Denied  [ ] Denied: Received too late

signed  ________________________________  Date:  __________________

Name  ________________________________ for the Architect.

Copies to:  [ ] District Representative  [ ] Contractor  [ ]
SECTION 01700
EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. General procedural requirements governing execution of the Work including, but not limited to, the following:

2. Field engineering and surveying.
4. Progress cleaning.
5. Starting and adjusting.
6. Protection of installed construction.
7. Correction of the Work.

1.2 RELATED SECTIONS

A. Section 01310 - Project Management and Coordination: Procedures for coordinating field engineering with other construction activities.

B. Section 01330 - Submittal Procedures: Procedures for submission of surveys.

C. Section 01731 - Cutting and Patching: Procedures for cutting and patching necessary for the installation or performance of other components of the Work.

D. Section 01770 - Closeout Procedures: Procedures for submission of final property survey with Project Record Documents, recording of District-accepted deviations from indicated lines and levels, and final cleaning.

1.3 SUBMITTALS

A. Qualification Data: For land surveyor or civil engineer to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

B. Certificates: At completion of the Work, after all DSA and other governmental agency approvals have been obtained, and prior to request for final payment, submit certificate signed by land surveyor or civil engineer certifying that location and elevation of improvements comply with requirements.

C. Certificates: At completion of the Work, after all governmental agency approvals have been obtained, and prior to request for final payment, submit a certificate signed by the land surveyor or professional engineer and the Contractor certifying that location and elevation of improvements,
quality and quantity of materials and installation are in compliance with requirements of the drawings and specifications approved by governmental agencies having jurisdiction over the Project.

1. If any changes from approved drawings and specifications were made in the Work, include a statement that changes to the Work were performed after such changes, including revised drawings and specifications, were approved by Architect, Division of the State Architect (DSA) and other governmental agencies having authority.

   a. Include a chronological list of changes with date each was approved by Architect and governmental agencies having authority.

D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal as relevant.

E. Certified Surveys: Submit two copies signed by land surveyor or civil engineer.

F. Final Property Survey: Submit two copies showing the Work performed and record survey data.

G. Pre-Demolition Photographic Survey: Submit one (1) copy of key-plans, photographs, and DVD.

H. Damage Survey: Submit one (1) copy of key-plans, photographs, and DVD.

I. Site and Building Inspection Survey: Submit one (1) copy of DVD, showing internal inspection of site utility piping, building main supply, return and waste lines, and building main and branch ductwork.

1.4 QUALITY ASSURANCE

A. Land Surveyor or Civil Engineer Qualifications: A professional land surveyor or civil engineer who is registered in the State of California to perform survey work and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS

Not applicable to this Section

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.

2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

3. Coordinate with, and obtain required approvals from authorities having jurisdiction.
B. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.

3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to College that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with, and obtain required approvals from authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by College faculty, staff, students or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify District Representative not less than 14 days in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without written permission from District Representative.

C. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.


3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify District Representative and Architect promptly and in writing.

B. General: Engage a land surveyor or civil engineer to lay out the Work using accepted surveying practices.
1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.

2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.

3. Inform installers of lines and levels to which they must comply.

4. Check the location, level and plumb, of every major element as the Work progresses.

5. Notify District Representative and Architect when deviations from required lines and levels exceed allowable tolerances.

6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by District Representative and Architect.

3.4 FIELD ENGINEERING

A. Identification: District will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of District Representative. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to District Representative before proceeding.

2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

E. Final Property Survey: Prepare a final topographic property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor or civil engineer, that principal building and site elements of Project are accurately positioned as shown on the survey. As a minimum, include the following information:

1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.

2. Finish floor elevations of all buildings at each doorway and entryway to the building.

3. Elevations of exterior walkways, curbs, curb and gutter combinations, gutter pavement, and ungraded area elevations, all at sufficient intervals to confirm drainage and slopes.

4. Invert elevations of all pipes in manholes and catch basins, and elevations of tops of manhole covers and catch basin grates (or gutter flow lines of side inlet basins).

5. Horizontal location, by measured dimension, of significant structures and site improvements, including buildings, curbs, gutters, drainage structures, and driveways.

6. Include on the survey a certification, signed by the surveyor, that principal metes, bounds, lines, and levels of the Project are accurately positioned as shown on the survey.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.

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

3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.

4. Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Final Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.

2. Allow for building movement, including thermal expansion and contraction.

G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3. PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.


2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.

3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris, and kept in a neat, organized and secure manner.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work, and a safe, neat and organized manner.

1. Remove liquid spills promptly.

2. Where dust would impair proper execution of the Work, clean the entire work area, as appropriate.

3. Once finishes are installed in an area, continue cleaning that area on a regular basis until College has accepted the area and is ready for occupancy.

4. Schedule cleaning operations so that dust and other contaminants resulting from cleaning operations will not contaminate wet paint, or other coatings or finishes during their cure period.

5. Comply with manufacturer's instructions for cleaning the surfaces and parts of finishes and equipment. Use only those cleaning materials and procedures recommended by the manufacturer of the item to be cleaned.
6. Provide cleaning during construction as necessary to ensure operations can proceed on schedule and that finish materials can be installed properly and viewed for determination of aesthetic characteristics.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Final Completion.

G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

H. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Final Completion.

J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

K. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify District Representative and Architect Record seven (7) working days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper installation, control sequence, or other conditions which may cause damage.

D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of responsible manufacturer’s representative in accordance with manufacturer’s’ instructions.
G. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

H. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

I. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

J. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Section 01400 - Quality Requirements.

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Final Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.9 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Section 01731 - Cutting and Patching.

   1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION
SECTION 01732

CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Requirements and limitations for culling and patching of Work.

1.2 RELATED SECTIONS

A. Section 01100 - Summary of Work: Work by College or by separate contractors performing work for College.

B. Section 02222 - Selective Demolition: Culling and removal of existing construction.

C. Individual product Specification Sections:

1. Cutting and patching incidental to Work specified in the Section.

2. Coordination with Work specified in other Sections for openings required to accommodate Work specified in those other Sections.

1.3 SUBMITTALS

A. Written Requests for Culling and Alteration:

1. Submit written request in advance of culling or alteration which affects:

   a. Structural integrity of any element of new or existing construction.

   b. Integrity of weather-exposed or moisture-resistant elements.

   c. Efficiency, maintenance, or safety of operational elements.

   d. Visual qualities of elements exposed to view in the completed construction.

   e. Work of College or by others under separate contract with College.

   f. Existing construction not otherwise indicated to be revised by Work under the Contract.

2. Include in requests for culling and alteration:

   a. Identification of Project.

   b. Location and description of affected Work. Include shop drawings as necessary to identify locations and communicate descriptions.

   c. Explanation of necessity for cutting and patching.

   d. Description of proposed Work and products to be used.

   e. Alternatives to culling and patching.

   f. Effect on existing construction.
g. Effect on work by College or by separate contractors performing work for College.

3. Include written evidence that those performing work under separate contract for College have been notified and acknowledge that culling and patching work will be occurring. Include written permission for intended cutting and patching, included scheduled times.

4. Indicate date and time culling and patching Work will be performed.

1.4 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety.

1. Primary operational systems and equipment.
2. Fire suppression systems.
3. Mechanical systems piping and ducts.
4. Control systems.
5. Electrical Wiring System.

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Equipment support.
4. Piping, ductwork, vessels, and equipment.
5. Noise and vibration control elements and systems.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect’s opinion, reduce the building’s aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

PART 2 - PRODUCTS

2.1 PATCHING MATERIALS

A. Patching Materials, General: As required for original installation and to match surrounding construction.

B. Product Substitution: For each proposed change in materials, submit request for substitution under provisions of Section 01630 - Product Options and Substitutions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examination, General: Inspect existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.

B. After uncovering existing Work, inspect conditions affecting proper accomplishment of Work.

C. Beginning of cutting or patching shall be interpreted to mean that existing conditions were found by Contractor to be acceptable.

3.2 PREPARATION

A. Temporary Supports: Provide supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.

B. Weather Protection: Provide protection from elements for areas which may be exposed by uncovering Work. Maintain excavations free of water.

3.3 CUTTING AND PATCHING

A. Cutting and Patching, General: Execute cutting, fitting, and patching, excavation and fill, to as necessary to complete the Work.

1. Unless specifically indicated on Structural or Architectural Drawings, all alterations or modifications to structural elements by cutting, drilling, boring, bracing, welding and similar actions shall have written approval by the Structural Engineer of Record and Division of the State Architect (DSA) prior to start of Work.

2. Coordinate installation or application of products for integrated Work.

3. Uncover completed Work as necessary to install or apply products out of sequence.

4. Cut, remove and replace defective and non-conforming Work.

5. Cut and patch as necessary to provide openings in the Work for penetration of mechanical and electrical Work.

B. Cutting:

1. Execute cutting methods to avoid damage to adjoining Work, and which will provide appropriate surfaces to receive final finishing.

2. Execute cutting and patching of weather-exposed, moisture-resistant elements and surfaces exposed to view by methods to preserve weather, moisture and visual integrity.

3. Cut rigid materials using diamond grit abrasive saw or similar cutter for smooth edges. Do not overcut corners.
a. Core drill holes through concrete and masonry.

b. Pneumatic tools will not be allowed without prior approval.

C. Patching:

1. Restore substrates and finishes with products to match existing construction and as specified in product Sections of the Specifications for new construction.

2. Finish surfaces flush and textured to match surrounding finishes.

3. Fit work neat and tight allowing for expansion and contraction.

4. Butt new finished to existing exposed structure, pipes, ducts, conduit, and other penetrations through surfaces.

D. Finishing: Refinish surfaces to match adjacent and similar finishes as used for the Project.

1. For continuous surfaces, refinish to nearest intersection or natural break.

2. For an assembly, refinish entire unit.

END OF SECTION
SECTION 01770
CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Administrative and procedural requirements for contract closeout. Including, but not limited to, the following:

1. Inspection procedures.
2. Warranties.
3. Final cleaning.
4. DSA Closeout.

1.2 RELATED DOCUMENTS AND SECTIONS

A. General Conditions of the Contract: Requirements for Applications for Payment for Final Completion.

B. Section 01700 - Execution Requirements: Progress cleaning of Project site.

C. Section 01781 - Project Record Documents: Submission of Record Drawings. Record Specifications and Record Product Data.

D. Section 01782 - Operation and Maintenance Data: Preparation and submission of operation and maintenance manuals.

E. Section 01820 - Demonstration and Training: Requirements for instructing College's personnel.

F. Divisions 2 through 16 Sections: Specific closeout and special cleaning requirements for products of individual Sections.

1.3 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete. Include in the list a complete listing of items the Contractor determined to be deficient and has already corrected.

2. Advise College of pending insurance changeover requirements.

3. Submit specific warranties, workmanship bonds, maintenance and service agreements, final certifications, and similar documents.

4. Obtain and submit releases permitting College unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

5. Prepare and submit Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.

6. Deliver tools, spare parts, extra materials, and similar items to College's Representative. Label with manufacturer's name and model number where applicable.
7. College will make the final change-over to permanent locks at a back-charge cost of $6,000 to be assessed by deductive change order.

8. Complete start testing of systems.


10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.

11. Advise College of changeover in heat and other utilities.

12. Submit changeover information related to College's occupancy, use, operation, and maintenance.

13. Adjust and balance all systems and adjust all valves.

14. Check fluid and gas carrying pipe systems, roofs, flashing, gutters and downspouts for leaks. Repair and replace as necessary.

15. Lubricate all moving parts of machinery and equipment as recommended by manufacturers of the machinery and equipment.

16. Remove broken and scratched glass and replace with new glass complying with requirements of Contract Documents.

17. Submit a final Application for Payment according to the General Conditions of the Contract and Section 01280 - Applications for Payment.

18. Submit certified copy of Architect's final inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

19. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

20. Submit pest control final inspection report and warranty.

21. Instruct College's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, College's Representative and Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. College's Representative will process final payment minus retention after receiving certified application for payment from Architect.

1. Project Inspector will submit copies of incomplete items (Punch List) using approved form.

2. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.4 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Notice of Completion is indicated.
B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf view binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.

2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.

3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, DSA Application number or other identification as applicable, and name, address and telephone number of Contractor.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for Completion for entire Project or for a portion of Project:

   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

   c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

   d. Remove tools, construction equipment, machinery, and surplus material from Project site.

   e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, grease, films, stains, fingerprints and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition. Polish bright surfaces to shine finish.

   f. Remove debris and surface dust from limited access space, including floors, plenums, shaft and similar spaces.

   g. Sweep concrete floors broom clean.
h. Clean transparent material, including mirrors and glass in doors and windows. Remove glazing compound and other noticeable, vision-obscuring materials. Polish glass, taking care not to scratch surfaces.

i. Remove labels that are not permanent.

j. Touch up and otherwise repair and restore to slightly marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

k. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

l. Replace parts subject to unusual operating conditions.

m. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

n. Clean ducts, blowers, and coils if units were operated during construction.

o. Clean light fixtures, lamps, globes and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent fixture to comply with requirements for new fixtures.

p. Leave Project clean and ready for occupancy.

C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.

D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on College's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems or streams. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION
SECTION 01781

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.

2. Record Specifications.

1.2 RELATED SECTIONS

A. Section 01770 - Closeout Procedures: General requirements for closeout procedures, including submission of project record documents.

B. Section 01781 - Operation and Maintenance Data: Requirements for operation and maintenance manuals.

C. Divisions 2 through 16 Sections: Specific requirements for Project Record Documents for products in individual Sections, including warranty and guarantee requirements.

1.3 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit copies of Record Drawings as follows:
   a. Submit one set of marked-up Record Prints and two sets of digital copy on CD in Hi-Res.tif format.

B. Record Specifications: Submit one copy of marked-up Project Specifications, including addenda and contract modifications.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one clean, undamaged set of black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.

   b. Accurately record information in an understandable drawing technique.

   c. Record data as soon as possible after obtaining it, but within 24 hours maximum.
Record and check the markup before enclosing concealed installations.

d. At time of Final Completion, submit record drawings to the Architect for the further processing. Organize into sets and bind and label sets for the Architect's use.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.

b. Revisions to details shown on Drawings.

c. Horizontal locations and vertical depths of underground utilities and appurtenances, including both site utilities and those under buildings and structures, referenced to permanent surface improvements.

d. Horizontal and vertical locations of internal utilities and appurtenances concealed in construction, referenced to visible, accessible, permanent features of the buildings or structures.

e. Revisions to routing of piping and conduits.

f. Revision to electrical circuitry.

g. Actual equipment locations.

h. Duct size and routing.

i. Horizontal and vertical locations of concealed internal utilities and appurtenances referenced to visible, accessible, permanent features of the buildings or structures in which they are concealed.

j. Changes made by Change Order or Construction Change Directive.

k. Changes made following Architect's written orders and pertinent graphic and written responses to requests for Information (RFIs).

l. Details not on the original Contract Drawings.

m. Field records for variable and concealed conditions.

n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.

4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.

5. Mark important additional information that was either shown schematically or omitted from original Drawings. Mark new information that is important to the College but was not shown on Contract Drawings or Shop Drawings.

6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, request for information (RFI) numbers, and similar identification, where applicable.
7. Identify and date each drawing; include the printed designation "PROJECT RECORD DRAWINGS" in a prominent location on each drawing.

B. Format: Identify and date each Record Drawing, include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

2. Identification: As follows:
   a. Project name.
   b. Date.
   c. Designation "PROJECT RECORD DRAWINGS."
   d. Name of Architect and responsible design professional, if applicable.
   e. Name of Contractor and subcontractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual products installed, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.

3. Record the name of the manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.

5. 5. Note related Change Orders where applicable.

6. 6. Use pen and black ink so marks will reproduce clearly.

2.3 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference. Submit to the Architect for the Trustee's records.

1. Categories of requirements resulting in miscellaneous records include, but are not limited to, the following:
   a. Field records on excavations and foundations.
   b. Field records on underground construction and similar work.
c. Survey showing locations and elevations of underground lines.
d. Invert elevations of drainage piping.
e. Surveys establishing building lines and levels.
f. Authorized measurements utilizing unit prices or allowances.
g. Records of plant treatment.
h. Ambient and substrate condition tests.
i. Certifications received in lieu of labels on bulk products.
j. Batch mixing and bulk delivery records.
k. Testing and qualification of tradesmen.
l. Documented qualification of installation firms.
m. Load and performance testing.
n. Inspections and certifications by governing authorities.
   1) Blue or black line prints and other documents used to obtain permits from authorities having jurisdiction. Submit all prints and documents bearing official approval stamp of authorities having jurisdiction.
   2) Originals of all permits issued for the Work by authorities having jurisdiction.
   3) Originals of inspection cards complete by authorities having jurisdiction.
o. Leakage and water-penetration tests.
p. Fire-resistant and flame spread test results.
q. Final inspection and correction procedures.
r. Field test reports.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur, but within 24 hours maximum; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order legible condition, and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

1. Maintain 1 set of all record documents at the Project site for the entire duration of construction.
2. Clearly label each document or item "PROJECT RECORD DRAWING," "PROJECT RECORD SAMPLE," "PROJECT RECORD SPECIFICATIONS," or similar as appropriate and applicable.

C. Do not conceal Work requiring verification for record documents until such information has been verified and recorded.

D. Certification: Within the title block or immediately adjacent, on each drawing sheet of the original mark-up record drawings and the front covers of record specifications, include the following statement signed by the Contractor: "I certify to the best of my knowledge, information and belief that the information recorded on this drawing/specification is a complete and accurate record of the final Work of this Contract."

END OF SECTION
SECTION 01782
OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Maintenance manuals for the care and maintenance of products, materials, and finishes, and systems and equipment.
5. Instruction of the District's personnel in the operation and maintenance of building systems and equipment, including video tape records of instruction sessions.

1.2 RELATED SECTIONS

A. Section 01330 - Submittal Procedures: Procedures for submission of copies of submittals for operation and maintenance manuals.
B. Section 01770 - Closeout Procedures: Procedures for submission of operation and maintenance manuals.
C. Section 01781 - Project Record Documents: Procedures for preparing Record Drawings for inclusion with operation and maintenance manuals.
D. Section 01820 - Demonstration and Training: Procedures for instruction of District's operation and maintenance personnel, including use of operation and maintenance data.
E. Divisions 2 through 16 Sections: Specific operation and maintenance manual requirements for products in individual Sections.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

A. Operation and Maintenance Manuals: Submit three (3) copies of each manual in final form at least fifteen (15) days before final inspection. District will receive two (2) copies. Architect will return one (1) copy with comments after final inspection.
1. Correct or modify each manual to comply with Architect's comments. Submit six (6) copies of each corrected manual within fifteen (15) days of receipt of Architect's comments.

2. Corrected manuals shall be submitted fifteen (15) days before start of training of District's operation and maintenance personnel.

B. After final inspection submit video tapes of operation and maintenance instruction sessions.

1.5 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with the same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system, arranged in sections matching the name, number, and organization of the Project Specification Sections. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
   1. Subject matter included in manual.
   2. Name and address of Project, if off campus.
   3. Names and addresses of District and College.
   4. Date of submittal.
   5. Name, address, and telephone number of Contractor.
   6. Name and address of Architect and responsible design professional, if applicable.
   7. Crossreference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and crossreferenced to Specification Section number in Project Manual.
   1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
   1. Binders: Heavyduty, 3-ring, vinylcovered view, looseleaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2 by 11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversized sheets.
      a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Crossreference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
      b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, District contract number, Division of the State Architect (DSA) project identification numbers, and subject matter of contents. Indicate volume number for multiple-volume sets.
   2. Dividers: Heavy paper dividers with plastic covered tabs for each section. Mark each tab to indicate contents and associated Specification Section number. Include typed list of products and major components of equipment included in the section on each divider, crossreferenced to Specification Section number and title of Project Manual. Reference the corresponding video tape where applicable.
   3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

6. Video Tape:
   a. Where 2 or more video tapes are necessary to accommodate data, correlate data in each video tape into related groupings according to the Project Manual table of contents. Crossreference other video tapes where necessary to provide essential information for proper operation or maintenance of the piece of equipment or system.
   b. Identify each video tape jacket on front and spine, and on the long edge of each video tape cassette, with the printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, DSA A# or other identifying information as applicable, and subject matter covered. Indicate volume number for multiple volume sets of video tapes.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:
   1. Type of emergency.
   2. Emergency instructions.
   3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
   1. Fire.
   2. Flood.
   5. Power failure.
   7. System, subsystem, or equipment failure.
   8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of District's operation and maintenance personnel for notification of installer, supplier, and manufacturer to maintain warranties.
D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component and other nameplate data.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.

9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.

2. Equipment or system breakin procedures.

3. Routine and normal operating instructions.

4. Regulation and control procedures.

5. Instructions on stopping.


7. Seasonal and weekend operating instructions.

8. Required sequences for electric or electronic systems.

9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify colorcoding where required for identification.

2.5 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual’s table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and crossreference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.

2. Manufacturer’s name.

3. Color, pattern, and texture.


5. Reordering information for specially manufactured products.
D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in the manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and crossreference Specification Section number and title in Project Manual.

1. At the front of each section in the manual, provide a tabbed divider page indicating the following:
   a. Name, address, and telephone number of local firm capable of providing factoryauthorized repair and maintenance for each piece of equipment.
   b. Names, addresses, and telephone numbers of subcontractors and suppliers related to each material, system, and piece of equipment.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard printed maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.
D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training videotape, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and crossreferenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by District's operation and maintenance personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.

2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by District's operation and maintenance personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.

1. Do not use original Project Record Documents as part of operation and maintenance manuals.

2. Comply with requirements of newly prepared Record Drawings in Section 01781 - Project Record Documents.

G. Comply with Section 01770 - Closeout Procedures for the schedule for submitting operation and maintenance documentation.

END OF SECTION
SECTION 01810

GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: General requirements that apply to implementation of commissioning without regard to specific systems, assemblies, or components. This Section is applicable to the following systems and equipment to be commissioned in this project:

1. All equipment and controls of the heating, ventilating and air conditioning systems.
2. Building automation system (and any integration with Campus controls system).
3. Domestic hot water systems.

B. Related Sections:

1. Section 01783 - Operation and Maintenance Data: Requirements for documentation for operation and maintenance of commissioned systems and equipment.

1.2 DEFINITIONS

A. Acceptance Phase: Phase of construction after Startup and initial checkout when Functional Performance Tests, operation and maintenance documentation review and training occurs.

B. Approval: Acceptance that a piece of equipment or system has been properly installed and is functioning in tested modes according to the Contract Documents and Commissioning Plan.

C. BoD: Basis of Design. A document 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. Basis of Design (BoD) documentation is included by reference. It is for information only and will be furnished upon request by the College.

D. Building Management System (BMS) or Building Automation System (BAS): The automated building system providing control and user interaction with select building systems.

E. Commissioning Authority (CxA): An independent agent hired directly by the College and not otherwise associated with the Design Professional(s). The CxA assists the College's Representative with coordinating commissioning and witnesses the commissioning activities on behalf of the College.

F. Commissioning Coordinator (CxC): Individual designated by the Contractor who plans, schedules, directs and coordinates all the College's commissioning activities, and serves as the Commissioning Authority's (CxA) single point of contact for all administrative and coordination issues.
G. Commissioning Issue: A condition that affects, prevents or inhibits commissioning, and must be resolved to complete the commissioning process. Commissioning Issues are documented on the Commissioning Issues Log.

H. Commissioning Issues Log: A log maintained by the CxA listing all Deficiencies and Commissioning Issues documented during the commissioning process. All issues require action, correction and closure, and will be categorized as Open or Closed.

I. Commissioning Plan (Cx Plan): A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

J. CxA: Commissioning Authority, an independent agent hired directly by the College and not otherwise associated with the Design Professional(s) or the Contractor. The CxA assists the College's Representative and Architect with coordinating commissioning and witnesses the commissioning activities on behalf of the College.

K. Commissioning Coordinator (CxC): Individual designated by the Contractor who plans, schedules, directs and coordinates all the College's commissioning activities, and serves as the Commissioning Authority's (CxA) single point of contact for all administrative and coordination issues.

L. Data Logger: A stand-alone measuring device installed separate from the BMS to monitor and record flow, current, status, pressure, temperature and the likes.

M. Deferred Testing: Any Pre-Functional Checks & Tests or Functional Performance Testing which cannot be completed when scheduled due to building structure, required occupancy condition or other Deficiency causing delay. CxA and College's Representative must approve deferral of testing.

N. Deficiency: A condition in the installation or function of a component, piece of equipment or system that is not in compliance with the requirements of the Contract Documents. A Deficiency will be considered a Commissioning Issue and documented on the Commissioning Issues Log.

O. Design Professional: The Design Professional(s) responsible for design of each portion of the project being commissioned.

P. Functional Performance Test (FPT): A test of the dynamic function, operation and control sequences of equipment and systems under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, alarm, power failure, etc. The FPTs can include Monitoring or Trending the system performance over time to verify integrated operation and system performance to the fullest extent.

Q. Indirect Indicators: Indicators of a response or condition, such as reading from a control system screen reporting a damper to be 100 percent open.

R. Installation or Installing Contractor: Contractor responsible for construction of a specific division of work.

S. Installation Verification: Field verification and documentation of proper installation of system components prior to Startup. Process is complete when systems are ready for Startup. Installation Verifications are organized under the System Readiness Checklist (SRC) forms.

U. Manual Test: Using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted with analyzing monitored data taken over time to make the observation).

V. Monitoring: The recording of parameters (flow, current, status, pressure and the like) of equipment operation using data-loggers or the Trending capabilities of BMS.

W. Non-Compliance: See Deficiency.

X. Non-Conformance: See Deficiency.

Y. OPR: Owner's Project Requirements. A document that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information. Address HVAC, lighting, indoor environment, energy efficiency, site, water use and other factors affecting the environmental responsiveness of the facility. Owner's Project Requirements (OPR) is included by reference. OPR is for information only and will be furnished by College upon request.

Z. Pre-Functional Checks & Tests: Based primarily on the manufacturer's detailed installation, startup and checkout sheets, these are the various checks and tests performed on a piece of equipment or system after preparing the equipment and system for initial operation. They are typically done to confirm that equipment and individual components are working properly, such as electrical spot measurements on motors, spot flow measurements, pressure testing, pipe flush-out and cleaning, control point-to-point checks, sensor calibration, actuator testing, etc., and include such things as mechanical system test and balance. Pre-Functional Checks & Tests are organized under the System Readiness Checklist (SRC) forms and must be completed prior to Functional Performance Testing.

AA. System Readiness Checklist (SRC): A checklist covering Installation Verification, Startup and Pre-Functional Checks & Tests to conduct and verify proper installation and Startup of the equipment prior to Functional Performance Testing. System Readiness Checklists are essentially a summary checklist, ideally a one-page cover sheet, governing all necessary inspections and procedures to prepare equipment and systems for Functional Performance Testing. Contractor/vendor completed Installation Verification, Startup and Pre-functional forms shall be attached to the related SRC.

BB. Percent Sampling: Inspecting or testing only a fraction of the total number of identical or near-identical pieces of equipment such as VAV boxes.

CC. Seasonal Tests: Functional tests that are deferred until conditions closer to design are experienced.

DD. Startup: Initial starting or activating of equipment usually performed by the Installation Contractor.

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

FF. TAB: Testing, Adjusting, and Balancing or Test and Balance.

GG. Test Procedures: The step-by-step process which must be executed to fulfill the Test Requirements.

HH. Test Requirements: Requirements, indicating what modes and functions shall be tested.

II. Trending: Monitoring using the Building Management Systems (BMS) to aid in functional testing and verify system operation and performance under actual operating conditions.
JJ. Warranty Issues: Operational and outstanding issues and deficiencies identified during the Warranty Period.

KK. Warranty Period: Warranty Period for the entire project, including components. Refer to General Conditions, Warranty, Guaranty, and Inspection of Work, for Warranty, Extended Guarantees, and Correction Period provisions.

1.3 SUMMARY DESCRIPTION OF COMMISSIONING

A. Commissioning is a systematic process of ensuring that building systems are installed and perform functionally and interactively as intended according to the Owner's (College's) Operational Requirements (OPR), Basis of Design (BOD), and the requirements of the contract documents.

B. Commissioning during the design phase is intended to achieve the following specific objectives in development of the Contract Documents:
   1. Review the OPR and BOD for clarity and completeness. The design team shall update the OPR and BOD as required.
   2. Review Design Documents, prior to mid-phase construction documents completion, for adherence to the OPR and BOD.
   3. Incorporate commissioning requirements into the Contract Documents.
   4. Verify Commissioning Authority's (CxA) design review comments are incorporated into subsequent design documents.

C. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:
   1. Finalize the Commissioning Plan.
   2. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry-accepted minimum standards and that they receive adequate operational checkout and testing by the Installation Contractors.
   3. Verify and document proper performance of equipment and systems.
   4. Verify that operation and maintenance documentation is provided and is complete.
   5. Develop a systems manual that provides future operating staff the information necessary to optimally operate the commissioned systems.
   6. Verify that the College's facilities and operations personnel are trained per the contract document requirements.

D. Commissioning during the warranty phase is intended to achieve the following specific objectives according to the Contract Documents:
   1. Perform off-season deferred testing.
2. Review operational issues prior to end of warranty period so that warranty items are identified and corrected.

E. The commissioning process does not take away from or reduce the responsibility of the Contractor to provide a finished and fully functioning product. The Contractor has overall responsibility to assure that all systems are properly tested and commissioned, and that all required commissioning documents are completed and provided to the College.

F. Project will meet the Commissioning Requirements of LEED-NC v2.2, Energy & Atmosphere, Prerequisite 1 and Credit 3. Contractor (General Contractor), Installing Contractors, and suppliers are responsible to ensure that all requirements for commissioning are met in their respective work.

1.4 REFERENCES

A. ASHRAE:


1.5 COMMISSIONING TEAM

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

B. Members Appointed by Owner (College):

1. Commissioning Authority (CxA): The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. College will engage the CxA under a separate contract.
   a. The CxA, as an independent third party, may not be a member of the design team for the project.

2. Representatives of the facility user and operation and maintenance personnel.

3. Architect and engineering design professionals.

1.6 COLLEGE'S RESPONSIBILITIES

A. Provide the OPR documentation, prepared by the Commissioning Team and approved by College, to the CxA and each contractor for information and use.

B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.
C. Provide the BoD documentation, prepared by Architect and approved by College, to the CxA and each contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

1.7 EACH CONTRACTOR’S RESPONSIBILITIES

A. Each contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:

1. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.

2. Cooperate with the CxA for resolution of issues recorded in the Issues Log.

3. Attend commissioning team meetings.

4. Integrate and coordinate commissioning process activities with construction schedule.

5. Review and accept construction checklists provided by the CxA.

6. Complete paper and electronic construction checklists as Work is completed.

7. Provide completed checklists to the Commissioning Authority within two business days of completion of each checklist.

8. Review and accept commissioning process test procedures provided by the Commissioning Authority.


10. Provide summary of results of test procedures to College's Representative and CxA within two business days of completion of testing.

11. Identify issues along with proposed resolutions for any system where test procedures indicate operation that is not consistent with Contract Documents as well as OPR and BoD.

1.8 CxA’S RESPONSIBILITIES

A. Administrative: Organize and lead the commissioning team.

B. Commissioning Plan: Provide commissioning plan.

C. Schematic Design Review: Review the design at the end of the schematic design phase. Verify that each commissioned feature meets the College’s requirements. Provide a written report.

D. Construction Document Review: Review the construction documents prior to execution of the contract. Verify that the commissioning is adequately specified and verify that each commissioned feature meets the College’s requirements. Provide a written report.
E. Commissioning Meetings: Convene, attend and direct commissioning team meetings. At the discretion of the Architect, these meetings may be combined with the job progress meetings. Commissioning meetings shall be scheduled as needed but not less than monthly.

F. Submittal Review: Review the Contractor’s standard submittals for commissioned systems and assemblies to verify that each commissioned feature meets the College’s requirements, particularly as it relates to environmentally responsive characteristics.

G. Construction Checklists: Provide Project-specific construction checklists and commissioning process test procedures.

H. Issues Log: Prepare and maintain the Issues Log.

I. Check List Log: Prepare and maintain completed construction checklist log.

J. Independent Verification: Witness systems, assemblies, equipment, and component startup.

K. Quality Control: Verify the execution of commissioning process activities using random sampling. The sampling rate may vary from 1 to 100 percent. Verification will include, but is not limited to, equipment submittals, construction checklists, training, operating and maintenance data, tests, and test reports to verify compliance with the OPR. When a random sample does not meet the requirement, the CxA will report the failure in the Issues Log.

L. Training: Provide written documentation that training was conducted for appropriate facility operational staff, for all commissioned features and systems.

1. Unless otherwise indicated, training shall be provided by qualified personnel provided by Contractor, and may include subcontractors or manufacturer’s representatives.

M. Operation and Maintenance Data Review: Review the O&M manuals submitted by the Contractor in accordance with Division 01 Section “Operations and Maintenance Data.”

N. Systems Manual: Prepare a systems manual for delivery to the College along with the final commissioning report. Organize the final information into a single compilation, delivered as both electronic PDF files and hard copy documents.

1. Final versions of the OPR and the BoD.

2. Record (“As-built”) sequences of operations for all equipment as provided by the design professionals and contractors, including time of day schedules, schedule frequency, detailed point listings with ranges and initial set points for commissioned equipment and systems.

3. Operating instructions for all energy- and water-saving features and strategies.

4. Initial functional performance test results (benchmarks), blank test forms and recommended schedule for ongoing testing.

5. Seasonal operational guidelines.

6. Recommendations for recalibration frequency of sensors and actuators by type and use.

7. Single line diagrams for each commissioned system.
8. Troubleshooting table for continued achievement of OPR.

9. Guidelines for continuous maintenance of the OPR (operational requirements) and BoD (basis of operation).

O. Final Commissioning Report: Compile test data, inspection reports, and certificates; include them in either the systems manual or the commissioning process report. List each commissioned system and assembly, and include the following items, as a minimum:

1. CxA's statement of the system's or assembly's compliance with the OPR.

2. Description of the OPR.

3. Description of the project specifications.

4. Verification of installation (construction checklist disposition).

5. Functional performance testing and forms.

6. Operations and maintenance data evaluation.

7. Training program evaluation.

8. Value of the commissioning process.


P. Post-Occupancy Review: Return to the project site at the beginning of the 10th month of the 12-month warranty period. Review current building operations with facility staff and address any outstanding issues related to the OPR.

1. Interview facility staff to identify problems or concerns they have in operating the building as originally intended.

2. Provide suggestions for improvements and record these changes.

3. Identify problems that are part of the original construction contract and under warranty.

4. Assist facility staff in developing reports, documents and requests for services necessary to remedy outstanding problems.


1.9 SUBMITTALS

A. Normal Submittals:

1. The CxA shall receive from the Contractor a copy of approved submittals for equipment and systems to be commissioned.

B. Additional submittal data required for Commissioning shall be submitted to CxA for use in developing the Cx Plan and all commissioning forms:
1. Detailed manufacturer installation and startup manuals with checklists, troubleshooting procedures, operating and maintenance procedures.

2. Installation and checkout materials actually shipped with equipment, including actual field checkout forms to be used by factory or field technicians.

3. Shop drawings including detailed sequences of operation.

4. Warranty information.

1.10 OPERATING AND MAINTENANCE MANUALS

A. The Contractor shall compile Operation and Maintenance Manuals as specified in the contract documents. The O&M manual documents shall be clearly marked to highlight the actual equipment and features installed. In addition, the following shall be included for all systems and equipment commissioned:

1. Specification sections copied from the design documents including any addenda.

2. Approved submittal data, cut sheets and appropriate shop drawings.

3. Manufacturer’s Operation and Maintenance Instructions which shall include:

   a. Installation, startup and break-in instructions.
   b. All starting, normal shutdown, emergency shutdown, manual operation, seasonal changeover and normal operating instructions.
   c. Operation, Maintenance and Installation instructions originally shipped with the unit.
   d. Detailed preventative maintenance and service procedures including a schedule matrix checklist (checked as weekly, monthly, quarterly, etc.).
   e. Troubleshooting procedures.
   f. Parts list, edited to omit reference to items which do not apply.
   g. Lists of special tools required to service or maintain the equipment.
   h. Performance data, ratings and curves, etc.
   i. Warranty documents clearly identifying conditions required to maintained warranty, and specific conditions which may void the warranty.
   j. Any service contracts issued.

4. The BMS Installation Contractor shall include control drawings and detailed sequences of operation for each piece of equipment and its components.

B. For all systems and equipment commissioned, CxA will review for required content inclusion and completeness, and approve O&M manuals.

C. For all systems and equipment commissioned. Provide a separate “Systems Manual” which focuses on operating rather than maintaining equipment, particularly the interaction between equipment to include the following:

1. The final version of the BOD.

2. System single line diagrams.

3. As-built “Sequences of Operation”, control drawings and original set points.
4. Operating instructions for integrated building systems.

5. Recommended schedule of maintenance requirements and frequency if not already included in the project O&M manuals.

6. Recommended schedule for retesting of commissioned systems with blank test forms from the original Commissioning Plan.

7. Recommended schedule for calibrating sensors and actuators.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. All standard testing equipment required to perform Startup, Pre-Functional Checks & Tests and Functional Performance Testing shall be furnished by the Installation Contractor responsible for the equipment and systems being commissioned.

B. Special equipment, tools and instruments (only available from the vendor, specific to a piece of equipment) required for testing equipment shall be included in the base bid price, and turned over to the College at project completion.

C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerance specified in the Contract Documents. If not otherwise specified, the following minimum requirements apply:

1. Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.5 degree F and a resolution to + or - 0.1 degree F.

2. Pressure sensors shall have an accuracy of + or - 2.0 percent of the value range being measured (not full range of meter) and have been calibrated within the last year.

3. All equipment shall be calibrated according to the manufacturer's recommended intervals and recalibrated when dropped or damaged.

4. Calibration tags shall be affixed or certificates readily available for all test equipment.

2.2 COMMISSIONING FORMS

A. Installation Verification Form:

1. Forms will be developed by the CxA referencing the contract documents and manufacturer provided documentation provided during submittal.

B. Startup and Pre-Functional Checks & Tests forms.

1. Forms primarily consist of manufacturer and Contractor field installation and Startup checkout sheets, and shall be used where required and appropriate. The CxA will review all forms to ensure manufacturer-recommended procedures and tests are fully included. Forms shall include:

   a. Manufacturer's standard written installation and startup checkout procedures.
   b. Check boxes by each procedure.
c. Signatures and date block at the end of the form.
d. If applicable, controls point to point checks, sensor calibrations, and actuator testing.

2. Controls Installation Contractor or controls manufacturer shall provide point to point checkout, sensor calibration and actuator test forms, and shall use where required or appropriate.

C. System Readiness Checklist (SRC): SRCs are developed by the CxA with input from the CxC and Installation Contractors.

D. Functional Performance Test (FPT) forms:

1. The CxA will develop FPT forms with procedures to verify and document proper operation of each piece of equipment and system. FPT forms may contain:

   a. System and equipment or component name(s), location and identification number.
   b. Reference to system readiness checklist and start-up documentation.
   c. Date of testing and list of participating parties.
   d. Excerpt of the specification section describing the test requirements.
   e. A copy of the specific sequence of operations or other specified parameters being verified.
   f. Points list.
   g. Formulas used in any calculations.
   h. Required pre-test field measurements.
   i. Instructions for setting up the test.
   j. Special cautions, alarm limits, etc.
   k. Specific step-by-step procedures to execute the test in a clear, sequential and repeatable format, including any control system point value or setpoint overrides required to simulate a test condition or sequence mode.
   l. Definitions of control system trend data to be collected and provided to the CxA in electronic format for analysis and review.
   m. The expected system response and acceptance criteria of proper performance with a Yes/No check box to allow for clearly marking whether or not proper performance of each part of the test was achieved.
   n. A section for recording actual system response, notes and comments.
   o. Signatures and date block for the CxA approval.

2. Installation Contractor shall use Functional Performance Test forms provided by CxA.

3. The CxC and Contractor shall review all Functional Performance Tests (FPT) documents provided by the CxA prior to including them in the final Commissioning Plan.

PART 3 - EXECUTION

3.1 COMMISSIONING PROCESS OVERVIEW

A. The following narrative provides an overview of the typical commissioning tasks during construction and the general order in which they occur:

1. The Commissioning Authority (CxA) prepares a Preliminary Cx Plan during the project final design phase. The Cx Plan provides guidance in the execution of the commissioning process.

2. Commissioning during construction begins with a kickoff meeting conducted by the CxA where the commissioning process and systems to be commissioned are reviewed with the commissioning team members, including the Contractor and Installation Contractors. The
Preliminary Cx Plan is presented and reviewed, and specific requirements are discussed. The Contractor shall designate the CxC at or before this meeting.

3. The CxA shall review contractor submittals applicable to systems being commissioned for conformance to the BOD and OPR. This review shall run concurrent with DP design reviews and submitted to the Design team and the College.

4. As part of normal submittal, the Contractor shall submit to the CxA additional equipment documents and forms including manufacturer installation checklists, detailed startup procedures, proposed Pre-Functional Checks and Tests procedures, and equipment warranty information. The CxA reviews these submittal documents and forms for completeness, and may request additional data and uses these documents to develop specific check-lists and test procedures for the equipment and systems to be commissioned.

5. The CxA will update the Cx Plan with equipment specific documentation, check-lists, and test forms.

6. Additional meetings will be conducted throughout construction with Commissioning Team members, as required, to plan, scope, coordinate, and schedule commissioning activities, review documentation, and resolve Commissioning Issues and Deficiencies.

7. The CxA develops System Readiness Checklist (SRC) forms which summarize and track the Installation Verifications, Startup, and Pre-Functional Checks & Tests required for each system and equipment to be commissioned. The Contractor shall complete the SRC forms, and include completed Installation Verification, Startup, and Pre-functional Checks and Test forms to document that systems and equipment are ready for operation. The CxC shall submit the completed SRCS and associated documents to the CxA and College's Representative for approval before proceeding to Functional Performance Testing.

8. CxA will perform various inspections and back-checks of the completed Installation Verification forms submitted by the CxC as part of the SRC.

9. Installing Contractors, as directed by the CxC, shall perform Startup, and Pre-Functional Checks & Tests. The CxC shall document completion of the Installation Verification, Startup and Pre-Functional Checks & Tests on the System Readiness Checklists. The CxA will witness select Start-up and Pre-Functional Checks & Tests, and perform a sample number of inspections and back-checks where determined to be necessary.

10. The CxA will develop final equipment and system Functional Performance Test (FPT) procedures and forms. These test procedures are submitted to the Contractor and Installation Contractors for review and comment.

11. Once systems to be commissioned are verified ready for FPTs by the completion of the SRCS, FPTs are executed by the Installation Contractors under direction of the CxC, and witnessed by the CxA. The FPTs may be achieved by, or any combination of: Manual Testing; Monitoring via the BMS system Trending capabilities; or by stand-alone Data Loggers and analyzing the results.

12. During Installation Verification, Startup, Pre-Functional Checks & Tests, and Functional Performance Testing, all Deficiencies and Commissioning Issues are recorded by the CxA on the Commissioning Issues Log. The Contractor and its Installation Contractors shall correct Commissioning Issues and retest the system(s) without delay at no additional cost to the College.
13. The Contractor shall compile and complete the Operation and Maintenance Manuals per the contract documents requirements. The CxA will review for completeness and provide comments to the College’s Representative on the Operation and Maintenance documentation.

14. The CxA will review and provide comment to the College on the specified training provided by the Installation Contractors and shall verify that it has been completed.

15. The CxA will review the LEED Systems Manual requirements with the CxC and will provide assistance to the CxC in preparing this document.

16. The CxA will complete the Final Construction Phase Commissioning Report for the College.

3.2 SCHEDULING AND COORDINATION

A. The CxA will provide an initial schedule of commissioning events to the CxC at the commissioning kickoff meeting.

B. Contractor shall develop a detailed Start-up Schedule for all systems to be commissioned and coordinate with CxA to include commissioning milestones. The Contractor shall integrate all commissioning activities into the master construction schedule.

C. The CxC shall provide sufficient notice to the CxA and College’s Representative for scheduling and coordinating commissioning activities. A minimum two-week’s notice shall be provided to the CxA for witnessing equipment Start-ups, Pre-Functional Checks and Tests, and Functional Performance Testing.

D. The Commissioning Team shall address scheduling problems and make necessary notification in a timely manner in order to expedite the commissioning process.

3.3 MEETINGS

A. When commissioning team member attendance is required, as determined by the CxA and CxC, be punctual and attentive during the meeting.

1. The CxA will conduct a commissioning kick-off meeting, usually within 60 days of the commencement of construction. All team members involved in the commissioning process shall attend the kick-off meeting.

2. The CxA will plan other commissioning meetings as deemed necessary as construction progresses. These meetings will cover planning and coordination, and Commissioning Issues resolution.

3. The frequency of meetings will vary through construction, but generally increase during start-up and commissioning activities.

B. The CxA will write and distribute meeting minutes documenting the meeting discussion, conclusions, and actions for each team member.

3.4 INSTALLATION VERIFICATION, STARTUP, PRE-FUNCTIONAL CHECKS AND TESTS

A. System Readiness: Contractor shall utilize and complete System Readiness Checklists (SRC) to ensure equipment and systems are complete, operational, and ready for Functional Performance
Testing. The SRCs are checklists which summarize and track the completion of Installation Verification, Startup, and Pre-Functional Checks & Tests.

1. SRCs are developed by the CxA with input from the CxC and Installation Contractors.

2. Contractor shall document the progress and completion of Installation Verification, Startup, and Pre-Functional Checks and Test on the SRC. Upon completion, CM shall attach all associated Installation Verification, Startup and Pre-Functional Checkout and Testing forms to the SRCs and submit to the CxA for approval.

3. Approval of completed SRC by the CxA is required prior to Functional Performance Testing of equipment and system.

4. Each SRC may have more than one Installation Contractor responsible for its execution.

B. Contractor shall submit completed Installation Verification, Startup and Pre-Functional Checkout and Testing forms for each commissioned system.

1. Each piece of equipment and system shall receive a full Installation Verification, Startup, and Pre-Functional Checks & Tests.

2. The Contractor shall complete the Installation Verification forms. The Contractor shall be responsible for the completion of all Startup and Pre-Functional Check and Tests and associated forms. The CxA shall perform inspections and back-checks of the completed the Installation Verification and Pre-Functional Checks and Test forms, and associated witnessing of Startup and Pre-Functional Checks.

3. All completed forms shall be attached to the SRC and submitted for CxA and approval before proceeding with Functional Performance Testing.

4. At the discretion of the CxA and according to approved Cx Plan, Percent Sampling may be used for multiple identical pieces of non-life-safety or non-critical equipment (example: VAV boxes).

C. All tests and start-up procedures shall be conducted without compromise to human or equipment safety. The Contractor shall be responsible for the liability and safety of conducting all tests.

D. Contractor shall clearly identify and list any Deficiencies resulting from the Installation Verification, Start-up and Pre-Functional Checks and Tests on the SRC forms and immediately notify the CxA. Once Deficiencies are corrected and verified or tested, update and resubmit SRC and associated forms.

3.5 FUNCTIONAL PERFORMANCE TESTING (FPT)

A. The CxA will develop test procedures and Function Performance Test (FPT) forms for each piece of equipment and system to be commissioned.

1. Contractor shall assist the CxA in development of FPT forms by providing the required submittal data and updates, and providing additional equipment and system operation information when requested by CxA.

2. Prior to execution, the CxA will provide a copy of the test procedures to the Contractor (General Contractor and Installation Contractor). The Contractor and Installation Contractor shall review and approve the test procedures for feasibility, safety, equipment and warranty protection.
B. Installation Contractor shall execute all Functional Performance Tests per the approved test procedures on the FPT forms. All testing results shall be documented on the FPT forms; the forms shall be signed and dated by the representative performing the tests.

C. The CxA shall witness all FPT procedures per the Cx Plan. Contractor shall coordinate all Functional Performance Tests with the CxA, and provide a minimum of two weeks notice prior to conducting each system test.

D. Functional Performance Testing for each system must be successfully completed and signed by the CxA prior to formal approval of system commissioning.

E. Functional Performance Tests may be conducted using these approved test methods:
   1. Manually manipulating the equipment settings and observe performance and/or monitoring performance by analyzing results using the control system’s trending capabilities and/or stand-alone Data Loggers.
   2. Overwriting control system sensor values to simulate a condition, such as overwriting the outside air temperature to be something other than it actually is.
   3. Altering setpoints to force equipment into a mode of operation to verify a sequence. For example, to see the AC compressor lockout work at an outside air temperature below 55 degrees F, when the outside air temperature is above 55 degrees F, temporarily change the lockout setpoint to be 2 degrees F below the current outside air temperature.
   4. Using Indirect Indicators for testing responses will be allowed only after the actual conditions represented by the Indirect Indicators have been visually and directly verified, calibrated and documented on the SRC.

F. Setup:
   1. Each function and test shall be performed under conditions that simulate actual conditions as close as is practically possible.
   2. The Installation Contractor executing the test shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions.
   3. At completion of the test, the Installation Contractor shall return all affected building equipment and systems to their pre-test normal condition.

G. At the discretion of the CxA, and per the Commissioning Plan and College approval, a Percent Sampling approach may be used to functionally test multiple identical pieces of non-life-safety or non-critical equipment. If, after two attempts at testing the specified sample percentages, failures are still present, then 100% remaining units will be tested at the Installation Contractor’s expense.

H. Where the CxA requires BMS trending, the CxA will provide with the FPT form a points list that may include both hardware (inputs, outputs) and virtual / software points, and appropriate trending intervals.
   1. The Contractor shall provide trend data to the CxA in electronic format. As a College-approved alternative, the Contractor can provide the CxA remote access to the control system and provide training that will allow the CxA to directly download trend data.
3.6 DEFICIENCIES AND COMMISSIONING ISSUES

A. During the Installation Verification, Startup, and Pre-Functional Checks and Tests, all Deficiencies and Commissioning Issues will be documented on the inspection and test forms in use, and will additionally be documented by the CxA on a Commissioning Issues Log.

B. Immediate correction of minor Deficiencies identified during testing may be allowed at the discretion of the CxA. In such cases the Deficiency and identified resolution must still be documented on the commissioning form in use.

C. When Commissioning Issues are identified during Functional Performance Testing, the CxA will discuss with the executing Installation Contractor and/or CxC and determine whether testing can proceed or be suspended. The Commissioning Issue and any identified resolution will be documented on the commissioning test form in use in addition to the Commissioning Issues Log.

D. The CxA will maintain and update the Commissioning Issues Log, and document the issues resolution process. Copies will be distributed to the College, Contractor and Installation Contractors as appropriate.

E. All Deficiencies and Commissioning Issues shall be corrected promptly. The responsible party shall correct the issue and inform the Contractor and CxA in writing of the resolution and completion date. The CxA will record completion on the Commissioning Issues Log and the CxC shall reschedule testing with the CxA and Installation Contractor. Testing shall be repeated until passing performance is achieved or the College accepts the noted issue.

F. When there is a dispute regarding a Commissioning Issue, whether it is valid or who is responsible, additional parties may be brought into the discussion as appropriate. The CxA shall have the final interpretive authority and the College will have the final approval authority.

G. The CxA may recommend solutions to Deficiencies and Commissioning Issues. However, the burden of responsibility to solve, correct and perform required retests is with the Contractor, Installation Contractors, and the Design Professional(s).

H. Retesting:

1. For all Commissioning Issues identified during Functional Performance Testing, retesting is required to verify the resolution of the issue and to complete the FPT.

2. The time for the CxA and the College’s Representative to direct and witness retesting will be back-charged to the Contractor and Installation Contractor responsible for the Commissioning Issue as follows:

   a. If the Commissioning Issue is not related to any previous SRC inspection, Start-up or checklist deficiency, no cost will be assessed by the CxA or College for the first retest. Cost for additional required retests after the first retest will be back-charged.

   b. If the Commissioning Issue is related to any previously reported SRC inspection, Start-up or checklist Deficiency and reported resolved and determined during Functional Performance Testing to be faulty, additional costs will be assessed for all required retests.

3. Any required retesting shall not be considered a justified reason for a claim of delay or for a time extension.
3.7 TRAINING OF COLLEGE’S PERSONNEL

A. The CxC shall coordinate and schedule the training for College’s Personnel. The CxC shall ensure that training is completed per the requirements of the construction documents and specifications. Refer to Section 01820 - Demonstration and Training for detailed requirements.

B. Installation Contractors responsible for specific equipment and system training shall submit a written training plan to the Contractor for all equipment and systems to be commissioned no less than 30 days prior to start of training. Contractor shall submit training plan(s) to CxA and College’s Representative for review and approval. The training plan(s) shall cover the following elements:

1. Equipment and/or systems included in training.

2. Intended audience.

3. Location of training.

4. Subjects covered (description, duration of discussion, presentation methods, etc.).

5. Instructor’s name and qualifications.

C. The CxA shall review the training plans to verify compliance with the Specifications.

D. Contractor shall submit to CxA an “attendee signed” attendance sheets for each training session conducted.

3.8 DEFERRED AND SEASONAL TESTING

A. Before or during the Warranty Period, all Seasonal Testing or Deferred Testing shall be completed as part of the Contract. Tests shall be conducted by the Installation Contractor responsible for the equipment and systems, completed in the same manner as all other commissioning tests, and shall be witnessed and by the CxC.

B. Contractor shall coordinate with CxA and College’s Representative and schedule all Deferred and Seasonal Testing.

C. Contractor shall make final adjustments to the Operations and Maintenance Manual and as-buils needed for any modifications made during Deferred or Seasonal Testing.

3.9 PROJECT CLOSEOUT

A. Upon completion of all commissioning activities, the CxC will prepare and submit to the College a Final Commissioning Report detailing the Cx Plan and all commissioning activities. The CxC shall support this effort by providing all Contractor coordinated commissioning documentation.

3.10 NEAR-WARRANTY-END REVIEW

A. Within the three last months of the Warranty Period, the Contractor shall schedule and participate in a review of the commissioned systems with College representatives, design team, appropriate Installation Contractors and the CxA to identify Warranty Issues.
B. A list of Warranty Issues will be developed by the College and CxA. The Contractor shall be responsible for and ensure the cooperation of appropriate Installation Contractors to resolve Warranty Issues prior to the end of the Warranty Period.

C. After correcting noted Warranty Issues, the Contractor shall notify the CxA and College's Representative in writing, the CxA will back-checking and verify Warranty Issue as resolved.

D. Issues identified during the Warranty Period will remain Warranty Issues until satisfactory completion by Contractor and back-check verification by CxA, even if the Warranty Period expires during the correction and back-check period.

END OF SECTION
SECTION 01820

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Administrative and procedural requirements for instructing the College'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 installed under the Contract.

3. Demonstration and training visual presentation media and notes.

1.2 RELATED SECTIONS

A. Section 01310 - Project Management and Coordination: Requirements for pre-instruction conferences.

B. Section 01782 - Operation and Maintenance Data: Submittal requirements for operation and maintenance manuals.

C. Section 01810 - General Commissioning Requirements: Demonstrations during commissioning.

D. Divisions 2 through 16 Sections for specific requirements for demonstration and training for Work specified in those Sections.

1.3 SUBMITTALS

A. Instruction Program: Submit 10 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.

1. Receipt, review and acceptance of instruction program by College's Representative shall be condition precedent to approval of Contractor's application for payment in excess of 50 percent of the Contract Sum.

2. Submission of instruction program shall be scheduled to allow sufficient time for receipt, review and acceptance of instruction program by College's Representative and shall be not less than 3 weeks prior to proposed date of first training session.

3. At completion of training, submit four complete training manuals for the College's use, in addition to those required 0 & M Manuals for closeout.

B. Qualification Data: For firms and persons specified in Article titled "QUALITY ASSURANCE," herein, to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

E. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
1. Identification: On each copy, provide an applied label with the following information:
   a. Name of Project.
   b. Name and address of videographer.
   c. Name of Architect.
   d. Name of Contractor.
   e. Date of video recording.
   f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

2. Transcript: Prepared on B-1/2-by-11-inch (215-by-2BO-mm) paper, punched and bound in heavy-duty, 3-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording media. Include name of Project and date of video recording on each page.

1.4 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 Section 01400 - Quality Requirements, experienced in operation and maintenance procedures and training.

C. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Section 01310 - Project Management and Coordination. Review methods and procedures related to demonstration and training including, but not limited to, the following:
   1. Inspect and discuss locations and other facilities required for instruction.
   2. Review and finalize instruction schedule and verify availability of educational materials, instructors’ personnel, audiovisual equipment, and facilities needed to avoid delays.
   3. Review required content of instruction.
   4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

A. Coordination of Instruction Schedule: Coordinate instruction schedule with College’s operations. Adjust schedule as required to minimize disrupting College’s operations.

B. Coordination of Instructors: Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content. Allow for 30 days’ notice to College’s Representative.

C. Coordination with Operation and Maintenance Data: Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.
   1. Do not submit instruction program until operation and maintenance data have been reviewed accepted by College’s Representative.
2. Coordinate review of operation and maintenance data to make operation and maintenance data available at least 30 days prior to date scheduled for initial training session.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction 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. Fire protection systems, including fire alarm and fire-extinguishing systems.
2. Intrusion detection system.
3. Heat generation, including boilers, pumps and water distribution piping.
4. Refrigeration systems, including condensers, pumps and distribution piping.
5. HVAC systems, including air-handling equipment, air distribution systems and terminal equipment and devices.
6. HVAC instrumentation and controls.
7. Electrical services and distribution, including transformers, switchboards, panelboards and motor controls.
8. Lighting equipment and controls.
9. Communication systems, including voice and data systems and video equipment.

B. Schedule of Training Sessions: Arrange to have training conducted on consecutive days, with no more than 6 hours of training scheduled for anyone day. Concurrent classes will not be acceptable.

C. Training Modules, General: Prepare learning objectives and teaching outlines for each learning module that include a description of specific skills and knowledge that participant is expected to master.

D. Training Module Content: Training modules shall progress logically. Each training module shall be comprised of time spent both in the classroom and at specific location of subject equipment or system. As a minimum, cover the following subjects for each item of equipment and system:

1. Familiarization:
   a. Review catalog, parts lists, drawings, etc., which have been previously provided for the plant files and operation and maintenance manuals.
   b. Check out the installation of the specific equipment items.
   c. Demonstrate the unit and indicate how all parts of the specifications are met.
   d. Answer questions.

2. Safety:
   a. Using material previously provided, review safety references.
   b. Discuss proper precautions around equipment.
3. Operation:
   a. Using material previously provided, review reference literature.
   b. Explain all modes of operation (including emergency).
   c. Check out College’s personnel on proper use of the equipment.

4. Preventive Maintenance:
   a. Using material previously provided, review preventive maintenance (PM) lists including:
      1) Reference material.
      2) Daily, weekly, monthly, quarterly, semiannual, and annual jobs.
   b. Demonstrate how to perform Preventative Maintenance tasks.
   c. Demonstrate to College’s personnel what to look for as indicators of equipment problems.

5. Corrective Maintenance:
   a. List possible problems.
   b. Discuss repairs—point out special problems.
   c. Open up equipment and demonstrate procedures, where practical.

6. Parts:
   a. Show how to use previously provided parts list and order parts.
   b. Check over spare parts on hand. Make recommendations regarding additional parts that should be available.

7. Local Representatives:
   a. Where to order parts: Name, address, telephone.
   b. Service problems:
      1) Who to call.
      2) How to get emergency help.

8. Operation and Maintenance Manuals:
   a. Review any other material submitted.
   b. Update material, as required.

E. Field Training for Operations Personnel:
   1. Identify location of equipment components and controls.
   2. Review of component functions and theory of operation.
3. Identifying piping and flow options.
4. Identifying valves and explain their functions at various settings.
5. Identifying instrumentation:
   a. Location of primary element.
   b. Location of instrument readout.
   c. Discuss purpose, basic operation, and information interpretation.
6. Discuss, demonstrate, and perform standard operating procedure and round checks, including system start-up and shutdown procedure.
7. Review and perform safety procedures.
8. Perform the required equipment exercise procedures.
9. Discuss and perform preventative maintenance activities.
10. Identify and review safety items and perform safety procedures, if feasible.

F. Field Training for Maintenance and Repair Personnel: In addition to field training specified above for operations personnel, include the following:

1. Describe normal repair procedures.
2. Perform routine disassembly and assembly of equipment, if applicable, for inspections and tests.
3. Perform routine and maintenance and repair tasks, including mechanical and electrical operation for troubleshooting, adjustments and calibration.

G. Presentation Media:

1. Presentations shall utilize computer-generated, projected graphics utilizing Microsoft PowerPoint software, including animation as appropriate to enhanced presentation and viewer interest. Graphics shall include text and still and moving images. PowerPoint presentation shall be suitable for incorporation into video record of instruction.
2. Each session shall include mock-ups, samples and other visual aids as appropriate.
3. Each session shall include printed handouts and notes for each participant.
4. Produce sufficient printed materials to provide minimum of 5 unused copies for College's use in subsequent training programs.

H. Video Record: Each training session shall be recorded and reproduced on digital video disk (DVD). Video media shall be labeled with permanent computer-printed labels.
PART 3 - EXECUTION

3.1 PREPARATION

A. Preparation:

1. Submit final operation and maintenance manuals 15 days before instructing the College's personnel.

B. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.

C. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

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

B. Instructors: Engage qualified instructors to instruct College's personnel how to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.

2. College's Representative will furnish Contractor with names and positions of participants.

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 College through College's Representative, with at least seven calendar 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.

E. Cleanup: Collect used and leftover educational materials and deliver to College as directed by College's Representative. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION
SECTION 01890
EXISTING FACILITY RECONSTRUCTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Procedures and requirements for reconstruction of damaged existing improvements, including but not limited to:

1. Damaged existing utility lines including gas, water, sewer, electrical, telephone, low voltage electrical, cable TV, security, fire alarm and communications.

2. Damaged asphalt, concrete, paving.

3. Damaged concrete and masonry sidewalks, stairs, curbs, gutters, walls, planters, footings, vaults, driveways and slabs.

4. Damaged landscape, including all planting, tress, shrubs, lawn and groundcover.

5. Damaged irrigation system, including pipes, valves, sprinkler heads, controllers, control wires, control wire conduit, and sleeves.

6. Regrading and compaction of all site areas back to existing elevations.

B. Refer to other Sections of the Specifications for specific requirements applicable to Existing Facility Reconstruction for Alteration or Modernization projects.

C. Requirements of this Section apply to Sections in Divisions 2 through 16.

1.2 RELATED SECTIONS

A. Section 01110 - Summary of Work.

B. Section 01731 - Cutting and Patching.

1.3 RECONSTRUCTION OF EXISTING FACILITIES

A. Contractor may need to damage, demolish, or cut existing facilities in the execution of its work. The Contractor is required to reconstruct the existing facilities.

B. Work may result in Construction Equipment and Construction Vehicle damage to existing facilities. The Contractor is required to reconstruct the Vehicle and Equipment damage to existing facilities.

C. The Drawings and specifications are not intended to show in detail all existing utilities and existing facilities nor locate for the Contractor where existing utilities and facilities will require reconstruction. It is the responsibility of the Contractor to include in the Contract Price Allowances for the reconstruction of existing facilities. Reconstruction of existing facilities is part of the contract and is not considered additional work.
1.4 QUALITY ASSURANCE

A. Matching existing Construction: On Alteration/Modernization projects new materials are to match existing.

B. Determine type and quality of existing materials by inspection and testing. Existing facility materials shall be used as a standard of quality for reconstruction unless noted or specified otherwise.

PART 2 - PRODUCTS

A. Use reconstruction materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

B. Where extensive damage is present to existing facilities and new materials cannot be obtained to match existing, replace item entirely with new materials approved in advance by College and Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that all demolition and damage to existing facilities has been completed and areas are ready for reconstruction.

B. District Representative, Architect and Project Inspector will inspect reconstruction areas for extent of work required to be restored. Cracked or broken edges of concrete are not acceptable. Concrete and asphalt shall have unbroken edges with smooth saw cuts. Concrete sidewalk reconstruction shall begin at the nearest control or expansion joint. Small narrow broken or saw cut patches are not allowed.

3.2 PREPARATION

A. Clean areas where reconstruction will take place. Provide for smooth transition to existing improvements.

B. Remove debris and abandoned items from areas of reconstruction daily.

3.3 INSTALLATION

A. Coordinate work of all trades involved to expedite completion and to accommodate reconstruction of all damaged areas.

B. Protect existing improvements from further damage until project completion.

END OF SECTION
SECTION 02222

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Demolition and removal of portions of existing building, as indicated on Drawings.

B. Removal of building utility services, such as power and signal circuits and including capping and identification.

C. Removal of designated building equipment and fixtures.

D. Removal of designated walls, partitions and components, including cutting of new openings in existing construction for plumbing and electrical components.

E. Handling and disposal of removed materials.

F. Removal and protection of existing fixtures, materials, and equipment items indicated as "salvage."

1.2 RELATED SECTIONS

A. Section 01100 - Summary of Work: Requirements for scheduling and sequencing of the Work.

B. Section 01500 - Temporary Facilities and Controls: Barriers and barricades for personnel and property protection.

C. Section 01575 - Construction & Demolition (C&D) Waste Management: Separation and disposal of waste from demolition and construction activities.

D. Section 01732 - Cutting and Patching: General requirements for cutting and patching existing construction, including removal for new openings.

E. Division 16 - Electrical: Demolition of electrical components.

1.3 SUBMITTALS

A. Demolition and Removal Procedures and Schedule: Submit for Project record only.

B. Project Record Drawings: Submit in accordance with provisions specified in Section 01789 - Project Record Documents. Indicate verified locations of water, gas, power and signal systems on Project record drawings. Refer also to Section 01770 - Contract Closeout Procedures.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with specific requirements of California Building Code (CBC) and requirements of serving utilities. Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

1. Notify affected utility companies before starting demolition Work and comply with their requirements.

2. Notify College's Representative and Architect before starting demolition Work and comply with directions of College's Representative for barriers, noise abatement and dust control.
3. Do not close or obstruct walkways, passageways, roadways and fire hydrants without permits.

4. Conform to applicable regulatory procedures should hazardous or contaminated materials be encountered.

B. Pre-Construction Conference:

1. Convene a conference at the Project site 7 days prior to starting demolition to review the Drawings and Specifications, requirements of authorities having jurisdiction, instructions and requirements of serving utilities, sequencing and interface considerations and project conditions.

2. Conference shall be attended by supervisory and quality control personnel of Contractor and all subcontractors performing this and directly-related Work.

3. Submit minutes of meeting to College's Representative and Architect for Project record purposes.

1.5 PROJECT CONDITIONS

A. Field Measurements and Conditions: In addition to provisions of the General Conditions of the Contract, verify dimensions and field conditions prior to construction. Verify condition of substrate and adjoining Work before proceeding with demolition Work.

B. Sequencing and Scheduling: Refer to construction progress schedule requirements specified in Section 01320 - Construction Progress Documentation.

C. Existing Conditions: Conduct demolition to minimize interference with building areas to remain occupied and to surrounding landscaped areas. Maintain protected egress and access at all times.

PART 2 - PRODUCTS

Not Applicable to this Section.

PART 3 - EXECUTION

3.1 PREPARATION

A. Notification: Notify College's Representative minimum seven calendar days in advance of commencing demolition activities so College may complete salvage of items not included in demolition.

B. Hazardous Materials Abatement: It is not expected that hazardous materials will be encountered in the Work.

1. If present, hazardous materials will be abated by College under separate contract.

2. If materials suspected of containing hazardous materials are encountered, do not disturb them. Immediately notify College's Representative. College will remove hazardous materials under a separate contract.

C. Preparation for Demolition:

1. Erect and maintain weatherproof closures for exterior openings.

2. Erect and maintain temporary partitions or barriers to prevent spread of dust, fumes, noise, and smoke to provide for continued occupancy of adjacent facilities by College.

3. Protect existing construction which is not indicated to be altered.
D. Protection: Protect existing construction and adjacent areas with temporary barriers and security devices in accordance with requirements specified in Section 01560 - Temporary Barriers and Enclosures.

1. Review location and type of construction of temporary barriers with College's Representative and public safety authorities having jurisdiction.

2. Barriers shall control dust, debris and provide protection for building occupants in adjacent spaces from construction activities.

3. Maintain protected egress and access at all times, in compliance with requirements of authorities having jurisdiction.

3.2 DEMOLITION, GENERAL

A. Selective Demolition of Building Elements:

1. Use techniques acceptable to College's Representative and authorities having jurisdiction, and which will achieve intended results and provide protection of surrounding features to remain.

2. Some items may have been demolished prior to Work of this Contract. Verify existing conditions prior to start of demolition. If items are in the process of demolition or have been demolished by others, notify College's Representative for directions.

3. Some items may require postponement of demolition until late in Contract Time period.

4. Phase demolition as necessary to provide adequate interfacing of related Work.

5. Demolish in an orderly and careful manner. Protect existing foundation supporting structural members, utility structures and finish materials to remain.

6. Remove, store, and protect equipment and materials to be re-installed in manner to prevent damage from soiling, moisture, marring, denting, scratching, distortion and impacts.

7. Protect materials and equipment to remain in place.

B. Building Services and Utilities Demolition:

1. Disconnect, remove, and cap designated building services and utilities within Project area. Minimize effect on portions of services and utilities to remain.

2. Mark location of disconnected building services and utilities. Identify and indicate capping locations on project record drawings.

3. Coordinate cutting and capping sequences and procedures to minimize disruption of activities in adjacent spaces.

C. Cutting and Patching: Refer to requirements specified in Section 01732 - Cutting and Patching.

3.3 SALVAGED MATERIALS

A. Ownership: Unless otherwise indicated, all materials demolished and removed shall become property of Contractor.
B. Disposal of Materials: Contractor shall haul and dispose of all demolished and removed materials to offsite disposal sites in a legal manner, as specified in Section 01575 - Construction & Demolition (C&D) Waste Management.

1. Sort materials for recycling and disposition. Except where noted otherwise, immediately remove demolished materials from site.

2. Promptly remove from the site and properly dispose of all contaminated, vermin infested, or dangerous materials encountered.

C. Salvage: Confirm with College's Representative that all salvage by College is completed prior to commencement of demolition activities.

1. Contractor shall take care when removing salvageable material to avoid damaging the material itself and building components that are to remain.

2. As indicated on the Drawings, deliver indicated materials to College as directed.

3. Items of salvageable value, not otherwise indicated to be delivered to College as directed by College's Representative, shall be removed from the site by the Contractor as the Work progresses and immediately transported from the site for recycling or sale by Contractor. Storage or sale of salvaged items on the site by the Contractor will not be permitted.

END OF SECTION
SECTION 03100

CONCRETE FORMWORK

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Formwork for cast in place concrete, with shoring, bracing and anchorage.

B. Form accessories.

1.2 RELATED SECTIONS

A. Section 03200 - Reinforcing Steel: Reinforcement for concrete construction.

B. Section 03300 - Cast in Place Concrete: General requirements for concrete construction, including finish qualities.

1.3 REFERENCES

A. American Concrete Institute (ACI):
   1. ACI 117 - Standard Tolerances for Concrete Construction and Materials.
   2. ACI 318 - Building Code Requirements for Reinforced Concrete.
   3. ACI 301 - Specifications for Structural Concrete for Buildings.
   4. ACI 347 - Guide to Formwork for Concrete.


1.4 DEFINITIONS

A. Unexposed Finish: A general-use finish, with no appearance criteria, applicable to all formed concrete concealed from view after completion of construction.

B. Exposed Finish: A general-use finish applicable to all formed concrete exposed to view and including surfaces which may receive a paint coating (if any).

1.5 SYSTEM REQUIREMENTS

A. Formwork Design Requirements: Formwork products and execution specified herein are for finish surface quality only.

1. Design, layout and construction of formwork shall be solely the responsibility of the Contractor.

2. Design and construct formwork, shoring and bracing to conform to California Building Code (CBC) requirements and ACI 318.

3. Resulting concrete shall conform to shapes, lines and dimensions indicated and required.
4. Tolerances for concrete shall be as specified in ACI 117, ACI 301, ACI 318 and ACI 347, unless otherwise specified or indicated.

1.6 SUBMITTALS

A. Materials List: Forming materials in contact with concrete.

B. Product Data: Form release agent.

1.7 QUALITY ASSURANCE

A. Industry Standard: Formwork design and construction shall be in accordance with ACI 301 and ACI 1318.

B. Formwork Designer's Qualifications: When required by authorities having jurisdiction, designer of form work shall be a Civil or Structural Engineer registered to practice in the State of California.

1.8 REGULATOR REQUIREMENTS

A. Regulatory Requirements: Conform to California Building Code (CBC) Section 1906A, requirements for formwork, embedded pipes and construction joints.

B. Coordination: Coordinate work specified in this Section with other Sections which require placement of embedded products and provision of openings and recesses. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from the Architect before proceeding.

PART 2 - PRODUCTS

2.1 FORMING MATERIALS

A. Forming Materials, General: Conform to ACI 301. Provide materials for contact with concrete which will impart suitable surface quality to completed concrete, including the following.

1. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish forms in largest practicable sizes to minimize number of joints and to conform to joint configuration indicated on the Drawings.

2. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptable material. Provide lumber dressed on at least two edges and one side for tight fit. When unexposed concrete is intended to receive waterproofing, provide form as for exposed finish concrete.

B. Plywood for Form Surfaces:

1. Plywood for Concealed Surfaces: PS 1, undamaged face, minimum APA C-C Plugged EXT or APA Structural I Sheathing.

2. Plywood, for Exposed Surfaces: PS 1, smooth-faced, undamaged, APA A-C or B-B High Density Overlaid Concrete Form, Class I, if forms are intended to be re-used, or PS 1, smooth-faced, undamaged, APA B-B Plyform, Class I. Plywood for exposed surfaces shall be minimum 5/8-inch thick.
C. Hardboard: For curved surfaces, tempered hardboard, Masonite Corp. or equal.

D. Lumber: Douglas fir or Douglas fir-larch, grade appropriate for intended use, sound and undamaged straight edges, solid knots.

E. Fillets for Chamfered Corners: Wood molding at plywood or lumber forms; rigid plastic at steel, fiberglass and plastic forms.

F. Embedded Nailers: Clear all heart redwood or pressure preservative-treated (PPT) Douglas fir, edges reverse beveled to key into concrete.

2.2 FORMWORK MATERIALS

A. Formwork Materials, General: Conform to ACI 301. Provide materials to construct formwork to support forming materials in contact with concrete, of sufficient capacity to withstand pressures of concrete placement and to support concrete in place until cured, without distortion.

2.3 FORMWORK ACCESSORIES

A. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal.

1. Provide units that will leave no metal closer than 1 -1/2 inches to the plane of the exposed concrete surface.

2. Provide units that will leave no hole larger than 1-inch diameter.

B. Form Release Agent: Commercial formulation form release agent, colorless product with the following characteristics:

1. Will not bond with, stain concrete, absorb moisture or adversely affect concrete surfaces.

2. Will not impair subsequent treatments of concrete surfaces or bond of applied coatings.

3. Complies with applicable air quality regulations for volatile organic compounds (VOCs).

PART 3 - EXECUTION

3.1 CONSTRUCTED FORMWORK

A. Constructed Formwork, General: Construct and erect form work, shoring and bracing to achieve design requirements, in conformance to ACI 301, ACI 347 and California Building Code (CBC) Section 1906A ~ Formwork, Embedded Pipes and Construction Joints. Refer also notes on Structural Drawings.

B. Constructed Formwork Design:

1. Design and fabricate formwork for easy removal, without impact, shock, or damage to concrete surfaces or other portions of the work.

2. Design formwork to support all applied loads until concrete is adequately cured and has attained sufficient strength, within allowable tolerances and deflection limits.
C. Constructed Formwork Construction: Construct and brace form work to accurately achieve end results required by contract documents, with all elements properly located and free of distortion. Provide for necessary openings, inserts, anchorages, and other features shown or otherwise required.

1. Formwork Segments: Arrange and assemble form work to permit dismantling and stripping without damage to concrete.

2. Joints: Minimize form joints and make forms watertight to prevent leakage of concrete mortar. Locate form joints, at exposed concrete, to be symmetrical about center of panel, unless otherwise noted. Align joints symmetrically at exposed conditions.

3. Chamfers: Provide 3f4-inch chamfered edges and corners at all exposed locations, unless specifically indicated otherwise on the Drawings.

4. Permanent openings: Provide openings to accommodate Work specified in other Sections. Size and locate openings accurately. Securely support items built into forms; provide additional bracing at openings and discontinuities in formwork.

5. Temporary openings: Provide temporary openings for cleaning and inspection. Provide drain openings at bottoms of form work to allow water to drain. Locate temporary openings in most inconspicuous locations at base of forms, closed with tight-fitting panels designed to minimize appearance of joints in finished concrete Work.

D. Formwork Bracing and Shoring: Provide bracing and shores to ensure stability of formwork and accommodate all construction loads. Use form ties of sufficient strength and sufficient quantities to prevent formwork spreading. Maintain principal shores to support concrete until minimum required strength is achieved.

3.2 INSERTS, EMBEDDED PRODUCTS AND OPENINGS

A. Embedded Products: Provide formed openings where required for items to be embedded in or pass through concrete. Install accessories in accordance with manufacturer's instructions and referenced standards, level, straight and plumb.

B. Openings: Size and locate formed openings, depressions, recesses and chases to accommodate products to be applied to, built into and pass through concrete Work. Coordinate size, location and placement of inserts, embedded products, openings and recesses with Work specified in other Sections.

C. Anchors and Other Devices: Set and build into concrete form work anchorage devices and other embedded products required for Work to be attached to or supported by concrete elements.

D. Locating Embedded Products and Openings: Use setting drawings, diagrams, instructions and templates to set embedded products.

E. Screeds: Set screeds and establish level for tops of concrete slabs and leveling for finish surfaces. Shape surfaces as indicated on the Drawings. Provide cradle, pad or base type screed supports for concrete over waterproof membranes and vapor retarders.

3.3 FORM RELEASE AGENT
A. Form Release Agent: Provide either form materials with factory-applied non-absorptive liner or field-applied form coating. If field-applied coating is employed, thoroughly clean and recondition formwork and reapply coating before each use. Rust on form surfaces will not be acceptable.

B. Form Release Agent Application: Comply with manufacturer's instructions and recommendations.

C. Restrictions: Do not apply release agent where concrete will receive applied finish which might be affected by agent. Do not apply release agent where decorative wood graining is intended for concrete surface. Leave form face dry.

3.4 FORM CLEANING

A. Form Cleaning, General: Clean and remove foreign matter within forms as erection and placement proceeds. Clean formed cavities of debris prior to concrete placement.

B. Formwork Reuse: Do not reuse wood and plywood forming materials which contact concrete, except as follows:

1. High density plywood may be cleaned and reused for exposed concrete.
2. Unfaced plywood may be reused for concealed concrete.
3. Steel and fiberglass forming materials may be cleaned and reused.

C. Patching and Repairs: Patch tie holes with sheet metal patches and restore forms to like new condition prior to reuse.

3.5 FORMWORK REMOVAL

A. Removal of Non-Load-Bearing Formwork: Provided that concrete has hardened sufficiently that it will not be damaged and has achieved sufficient strength to support its own weight and all imposed construction and design loads, forms not actually supporting weight of concrete or weight of soffit forms may be removed after concrete has cured at not less than 50 degrees F for 24 hours.

1. Comply with notes on Structural Drawings and California Building Code (CBC) requirements.
2. Maintain curing and protection operations after form removal.

B. Removal of Load-Bearing Formwork: Do not remove shoring and forms supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, until concrete has attained 90 percent of specified compressive strength. In addition, the Contractor shall have determined that the actual compressive strength attained is adequate to support the weight of the concrete and superimposed loads.

1. Comply with notes on Structural Drawings and California Building Code (CBC) requirements.
2. Maintain curing and protection operations after form removal.

C. Formwork Removal:

1. Loosen forms carefully. Do not wedge pry bars, hammers or tools against concrete surfaces to be exposed to view.
2. Remove form work progressively so no unbalanced loads are imposed on structure. Remove form work without damaging concrete surfaces.

3. Remove or snap off metal spreader ties inside wall surface. Cut nails and form ties off flush and leave surfaces level and clean.

3.6 PATCHING

A. Schedule: Patch forming and tie holes immediately after form removal.

B. Cleaning: Clean surface of all loose materials and soiling.

C. Patching: Patch all holes and depressions with grouting gun and grout mix of one part cement and 2-1/2 parts mortar sand.

3.7 FORMWORK SCHEDULE

A. Footings and Walls, Not Exposed to View: Site fabricated plywood or lumber, coated with form release agent.

B. Footings and Walls, Exposed to View: Site fabricated plywood, coated with form release agent compatible with applied finish coatings.

END OF SECTION
SECTION 03200

REINFORCING STEEL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel bars for cast in place concrete.

B. Reinforcement accessories.

1.2 RELATED SECTIONS

A. Section 03100 - Concrete Formwork: Formwork for cast-in-place concrete; provisions for access for reinforcement Work.

B. Section 03300 - Cast in Place Concrete: Provisions for protection of reinforcement during concrete placement.

1.3 REFERENCES

A. American Concrete Institute (ACI):

1. ACI 301 - Specifications for Structural Concrete for Buildings.

2. ACI 318 - Building Code Requirements for Reinforced Concrete.

B. American Welding Society (AWS):

1. AWS 01.4 - Structural Welding Code--Reinforcing Steel.

2. AWS 012.1 - Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction.

C. ASTM International (ASTM):

1. ASTM A 615 - Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

2. ASTM A 706 - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

D. Concrete Reinforcing Steel Institute (CRSI):


2. CRSI 63 - Recommended Practice for Placing Reinforcing Bars.

3. CRSI 65 - Recommended Practice for Placing Bar Supports, Specifications and Nomenclature.
1.4 SUBMITTALS

A. Product Data:

1. Reinforcement supporting and spacing devices at exposed concrete only, to demonstrate non-corroding and non-staining characteristics.

2. Adhesive compounds.

B. Quality Control Submittals: Submit the following information related to quality assurance requirements specified:

1. Certifications: Mill test certificates for all reinforcing steel, showing physical and chemical analysis. If steel is to be welded, include in chemical analysis welded the percentages of carbon, manganese, copper, nickel, and chromium, and optionally the percentages of molybdenum and vanadium.

2. Certifications: If steel is to be welded, submit certifications signed by AWS Certified Welding Inspector (CWI) of prequalified welding procedures, qualifications of welding procedures unless prequalified, qualification of welding operators, and qualification of welders.

1.5 QUALITY ASSURANCE


B. Regulatory Requirements: Conform to California Building Code (CBC) Section 1907A, requirements for details of reinforcement.

C. Qualification of Welds, Welding Operators, and Welders: Comply with UBC Standard 19-2. Perform welding procedure qualification, except for prequalified procedures, as required by AWS 01.4, prior to executing any welding of reinforcing steel.

1. Only AWS Certified Welding Inspectors shall be used for tests and qualifications associated with welding of reinforcing steel.

2. Only AWS qualified welders or welding operators shall perform welding of reinforcing steel.

D. Coordination: Coordinate Work specified in this Section with other Sections which require placement of embedded products and provision of openings and recesses. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request direction from College's Representative before proceeding. College's Representative will consult with Architect (structural engineer) and provide direction to Contractor.

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver reinforcement in bundles marked with durable identification tags.

B. Storage: Store reinforcement to avoid excessive rusting or fouling with grease, oil, dirt or other bond-weakening coatings.

C. Handling: Take precautions to maintain reinforcement identification after bundles are broken.
PART 2 - PRODUCTS

2.1 STEEL BAR REINFORCEMENT

A. Reinforcing Steel Bars: Deformed steel, ASTM A 615, grade as indicated in Notes on Structural Drawings.

B. Stirrup Bars: Deformed steel, ASTM A 615, grade as indicated in Notes on Structural Drawings.

C. Reinforcing Steel Bars to be Welded: ASTM A 706, grade as indicated on Structural Drawings.

2.2 REINFORCEMENT ACCESSORY MATERIALS

A. Tie Wire: Minimum 16 gage annealed type, black or galvanized finish.

B. Chairs, Bolsters, Bar Supports and Spacers: Wire-bar-type devices, complying with CRSI Manual of Standard Practice, for spacing, supporting and fastening reinforcing bars in place. Provide size and shape as required for strength and support of reinforcement during reinforcement installation and concrete placement.

1. Supports at Slab on Grade: Provide devices with load-bearing pads or horizontal runners where base material will not support chair legs, to prevent puncture of vapor retarder or provide precast concrete block bar supports of equal or greater strength to specified concrete.

2. Corrosion Resistance;
   a. Provide plastic coated, plastic-tipped (CRSI, Class 1) or stainless steel types at exposed-to-view concrete surfaces.
   b. Provide only stainless steel (CRSI Class 2) at exterior exposed surfaces to be painted.

2.3 REINFORCEMENT FABRICATION

A. Reinforcement Fabrication, General: Conform to CRSI Manual of Practice, providing required concrete cover as shown on the Structural Drawings.

B. Splices: See Structural Drawings.

1. Do not splice bars unless specifically shown on the Structural Drawings.

2. Where splices are not indicated on Drawings, locate splices at point of minimum stress and review locations with Architect (Structural Engineer) before fabrication and placement. Submit mechanical splice data to Architect (Structural Engineer) for review prior to use.

3. Splices shall be staggered so that not more than one-third of the reinforcing bars are spliced at anyone location.

PART 3 - EXECUTION

3.1 PREPARATION

A. Cleaning: Clean reinforcement to remove loose rust and mill scale, soil, frost, and other materials which may reduce or destroy bond with concrete.
B. Adjustment and Inspection: Do not bend or straighten reinforcement in a manner injurious to material. Do not bend bars more than one time. Do not use bars with kinks or bends not shown on Drawings and reviewed shop drawings, or bars with reduced cross-section due to corrosion or other cause. Remove and replace bars that have kinks or bends, not approved, are injured or have been bent more than once.

3.2 REINFORCEMENT PLACEMENT

A. Reinforcement Placement, General: Place and secure reinforcement as specified herein, as indicated and noted on Drawings and in compliance with recommended details and methods of reinforcement placement and support specified in CRSI 63 ~ Recommended Practice for Placing Reinforcing Bars.

1. Place, support and secure reinforcement to prevent displacement. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

2. Locate reinforcement to provide required cover by concrete. If not otherwise indicated on Drawings or specified herein, provide concrete cover in compliance with ACI 318.

B. Reinforcement Spacing: Space reinforcement as indicated on Drawings. If not indicated, maintain clear spacing of the bar diameter but not less than 1 inch nor less than 1-1/3 times maximum size aggregate.

1. Where parallel reinforcing is placed in more than one horizontal layer, place as many bars as possible in the outboard layer while maintaining the required lateral clearances and spacing.

2. For bars in the inboard layer, place them directly in vertical alignment with those of the outboard layer, while maintaining not less than a one-inch clear space between them, nor the diameter of the largest bar between the layers.

C. Coordination: Locate reinforcement to accommodate embedded products and formed openings and recesses.

D. Slab on Grade Reinforcement: Provide load bearing pads under supports or provide precast concrete block bar supports. Do not displace or damage vapor retarder at slab on grade.

E. Dowels: Secure tie dowels in place before depositing concrete. Provide No.3 bars for securing dowels where no other reinforcement is provided.

3.3 CONCRETE COVER

A. Concrete Cover: Except where otherwise indicated on Drawings, provide minimum concrete coverage for reinforcement as follows:

1. Formed walls, exterior face (above grade):
   a. No.5 and smaller: 1-1/2 inch.
   b. No.6 and larger: 2-inches.

2. Slabs on grade: 2-inches from top.
3.4 REINFORCEMENT SUPPORTS

A. Reinforcement Supports: Support reinforcement on metal chairs, spacers or metal hangers to provide required coverage and to properly locate reinforcement. Do not use wood. Avoid cutting or puncturing vapor retarder during reinforcement placement and concreting operations. Repair damage before placing concrete.

B. Support Spacing: Space chairs and accessories in conformance with CRSI 65 - Recommended Practice for Placing Bar Supports, Specifications and Nomenclature.

3.5 REINFORCEMENT SPLICES

A. Reinforcement Splices, General: Provide standard reinforcement splices by lapping ends, placing bars in contact and tightly wire tying. Comply with details and requirements of ACI 318 for minimum lap of spliced bars and criteria indicated on the Drawings.

B. Clearances for Splices: Wherever possible, provide minimum 1-1/2 inch clearance between sets of splices. Stagger horizontal bars so that adjacent splices will be minimum 48-inches apart.

3.6 WELDING OF REINFORCEMENT STEEL

A. Welding: Perform welding under continuous inspection and supervision of a qualified Registered Deputy Inspector employed by testing and inspection agency. Weld reinforcement as indicated on Drawings or as directed by College's Representative. College's Representative will consult with Architect (structural engineer) and provide direction to Contractor.

B. Carbon Equivalent (CE): CE of reinforcing bars or splice materials shall be calculated from chemical composition as indicated in mill report by following formula:

\[ CE = \% C + \% Mn/6 + \% Cu/40 + \% Ni/20 + \% CR/10 - \% Mo/50 - \% V/10 \]

If mill test report is not available, make chemical analysis of bars representative of bars to be welded. Bars with CE above 0.75 shall not be welded. No welds shall be made at bends in reinforcing bars.

3.7 CORRECTIONS DURING CONCRETE PLACEMENT

A. Corrections During Concrete Placement: Caution workers to not walk on bars. Maintain reinforcing steel during placement of concrete; reset reinforcement in the event that it is displaced by runways, workers and other causes.
3.8 DEFECTIVE WORK

A. Defective Reinforcement Work: The following shall be considered defective and shall be ordered to be removed and reconstructed at no change in Contract Time and Contract Sum.

1. Bars with kinks or bends not shown on Drawings.
2. Bars injured due to bending or straightening.
3. Bars heated and field bent.
4. Reinforcement not placed in accordance with Drawings and Specifications.
5. Rusty or oily bars.

END OF SECTION
SECTION 03300
CAST IN PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Cast in place concrete for site work and building structure:
   1. Equipment pads.
   2. Wall infill at Concrete opening.

1.2 RELATED SECTIONS

A. Section 01400 - Quality Control: Concrete tests and inspections.
B. Section 03100 - Concrete Formwork: Formwork for cast-in-place concrete.
C. Section 03200 - Reinforcing Steel: Steel bar reinforcement for cast-in-place concrete.
D. Section 05090 - Anchors and Fasteners: Grouting and anchoring equipment.
F. Division 15 - Mechanical: Requirements for equipment pads.
G. Division 16 - Electrical: Requirements for equipment pads.

1.3 REFERENCES

A. American Concrete Institute (ACI):
   2. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
   3. ACI 301 - Specifications for Structural Concrete for Buildings.
   4. ACI 302.1 - Guide for Concrete Floor and Slab Construction.
   5. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
   6. ACI 305 - Hot Weather Concreting.
   7. ACI 306 - Cold Weather Concreting.
   8. ACI 308 - Standard Practice for Curing Concrete.
1.4 SUBMITTALS

A. Product Data: Proprietary admixtures, curing compounds, hardeners and sealers. Indicate compatibility of curing compounds, hardeners and sealers with materials used for installation of applied flooring.

B. Mix Designs: Submit mix designs for review by Architect (Structural Engineer) before concrete operations begin. Comply with requirements stated on Structural Drawings.
   1. Submit proposed mix designs and test data for each class of concrete and for each method of placement.
   2. Mix designs shall be prepared and signed by a Civil or Structural Engineer registered to practice in the State of California and shall be as acceptable to authorities having jurisdiction.
   3. Identify for each mix submitted the method by which proportions have been selected.
      a. For mix designs based on field experience, include individual strength test results, standard deviation, and required average compressive strength \( f_c \) calculations.
      b. For mix designs based on trial mixtures, include trial mix proportions, test results, and graphical analysis and show required average compressive strength \( f_c \).
      c. Indicate quantity of each ingredient per cubic yard of concrete.
      d. Indicate type and quantity of admixtures proposed or required.
      e. Indicate water to cement ratio by weight.
      f. Indicate slump.

C. Quality Control Submittals: For Project record, submit the following. Certifications shall be notarized affidavits by an independent testing and inspection agency. Certification costs shall be included in Contract Sum.
   1. Materials certifications:
      a. Certify that the cement conforms to Specifications.
      b. Sample, test and certify concrete aggregate for grading, soundness and abrasion, before concrete mix designs are established.
   2. Field tests: Submit reports of all slump, strength and air content tests as required by authorities having jurisdiction and as indicated on the Drawings and specified herein.
   3. Delivery tickets: Submit copies of delivery tickets complying with ASTM C 94 for each load of concrete delivered to site. Include on the tickets the additional information specified in the referenced ASTM standard.

1.5 QUALITY ASSURANCE

A. Industry Standards: Perform cast in place concrete Work in accordance with ACI 301, ACI 302 and ACI 318, and tolerances as established in ACI 117.
   1. When outdoor ambient air temperature is higher than 90 degrees F, comply with ACI 305.
2. When air temperature in the shade and away from artificial heat falls below 40 degrees F, or when concrete without special protection is likely to be subject to freezing temperatures before expiration of specified curing period, comply with ACI 306.

B. Regulatory Requirements: Conform to California Building Code (CBC), Chapter 19A. Chemical products field-applied to concrete shall comply with applicable air quality requirements of authorities having jurisdiction.

C. Testing Agency Services: College will engage an independent testing and inspection agency to conduct tests and perform other services specified for quality control during construction.

D. Coordination: Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories. Coordinate concrete requirements with Work specified for underground utilities and mechanical and electrical equipment pads and bases.

1.6 DELIVERY AND HANDLING

A. Protection During Concrete Placement: Provide protective coverings and runways, and use appropriate equipment and means of access to Work areas to avoid soiling or damage to existing conditions.

B. Run-Off: Prevent run off of water contaminated by construction agents and chemicals from soiling existing surfaces and from contaminating existing and future landscape areas.

PART 2 - PRODUCTS

2.1 CONCRETE MIX DESIGN


1. Concrete supplier shall determine mix designs and shall provide test results for each proposed mix design to establish the following:

   a. Gross weight and yield per cubic yard of trial mixes.
   b. Measured slump.
   c. Measured air content.
   d. Compressive strength developed at 7 days and 28 days, from not less than 3 test cylinders cast for each 7-day and 28-day test, and for each design mix.

2. Provide concrete for the following characteristics:

   a. 7-day compressive strength shall be at least 60 percent of required 28-day strength.
   b. 28-day compressive strength for concrete for elements indicated on Structural Drawings shall be as indicated on the Structural Drawings.
   c. 28-day compressive strength for concrete for elements indicated on other than Structural Drawings shall be as indicated on the Drawings or, if not indicated, as follows:
      1) Equipment pads, site appurtenances, exterior concrete slabs on grade and utility structures: Not less than 3000 psi.
      2) Pipe and conduit encasement, piping thrust blocks: Not less than 2000 psi.
   d. Water-cement ratio: As indicated on Structural Drawings.
   e. Chloride content of the entire mix shall not exceed 0.06 percent by volume.
B. Selection of Proportions:

1. The proportioning of ingredients shall be such that the concrete can be readily worked into forms and around reinforcement under conditions of placement to be employed, without segregation or excessive bleeding.

2. The acceptability of the mix proportions shall be determined by either laboratory trial batch or field experience methods, as specified in California Building Code (CBC) Section 1905A.3.

3. Proportioning by weight of loose, dry material, 94 pounds of cement shall be considered 1 cubic foot.

4. Fine aggregate volume shall be at least 35 percent, with a maximum of 50 percent, of the sum of the separate fine and coarse aggregate volumes.

5. Weighing equipment shall be accurate within 1 pound and be adjustable for varying aggregate moisture content.

6. A beam auxiliary shall register any part of the last 100 pounds of each aggregate. The aggregate hopper shall have a volume adjustment.

2.2 CONCRETE MATERIALS

A. Concrete Materials, General: Acquire cement and aggregates from single source for all cast in place concrete. Do not use aggregates that are deleteriously reactive.

B. Portland Cement: ASTM C 150, type as noted on Structural Drawings, gray color. Provide sulfate-resistant type if determined necessary by sulfate content tests of soil. type as indicated on Structural Drawings. Provide sulfate-resistant type if determined unnecessary by sulfate content tests of soil.

C. Cementitious Materials Other Than Portland Cement: Unless otherwise noted on Structural Drawings, include cementitious materials other than portland cement in concrete, by weight, as follows:


2. Ground Granulated Blast-Furnace Slag: 50 percent minimum.

3. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent combined minimum, with fly ash not exceeding 25 percent minimum.

4. Combined fly ash or ground granulated blast furnace slag shall reduce total amount of portland cement, which would otherwise be used, by not more than 15 percent.

D. Aggregates for Regular Weight Concrete: Fine and coarse aggregates, conforming to ASTM C 33, California Building Code (CBC) Section 1903A.3 and as follows.

1. Structural Concrete: Maximum size not larger than 1/4 of narrowest dimension between forms, 1/3 depth of slab nor 3/4 of minimum clear spacing between individual reinforcing bars. Maximum aggregate size shall be 1-1/2 inches.

2. Other than Structural Concrete: Conform to requirements for structural concrete except maximum aggregate for mass concrete shall be 1-inch.
E. Water: Clean, fresh and drinkable, free of amounts of acids, alkalis and organic materials detrimental to concrete production.

2.3 ADMIXTURES

A. Chemical Admixtures, General: Admixtures may be used only with the written acceptance of the Architect (Structural Engineer) and only if they comply with referenced standards all other requirements of the Contract Documents. Admixtures which result in more than 0.1 percent of soluble chloride ions by weight of cement are prohibited. Use no admixtures not included in mix design. Products of the following manufacturers are specified and will be acceptable provided they comply with referenced standards and all other requirements of the Contract Documents:


2. Euclid Chemical Co., Cleveland, OH (216/531-9222 or 800/321-7628).


5. Sika Corporation, Lyndhurst, NJ (201/933-8800; local representative, Santa Fe Springs, CA, 310/941-0231).

B. Air-Entraining Admixture: ASTM C 260 and certified by manufacturer for compatibility with other mix components.

1. Air-Mix or Perma-Air by Euclid Chemical Co.

2. MB-VR or Micro-Air by Master Builders Technology, Inc.


4. Sika AER by Sika Corporation.

C. Water-Reducing Admixture: ASTM C 494, Type A, Kel-Crete Admixture, manufactured by Kel-Crete Industries, ICC Evaluation Service, Inc. (ICC ES) Evaluation Report No. 5005. Equivalent products will be considered in accordance with the "or equal" provision specified in Section 01630 - Product Options and Substitutions. Provide water-reducing admixture which enhances the characteristics of concrete to extent no less beneficial than the following:

1. Water reduction: Not less than 5 percent.

2. Increase in compressive strength: Not less than 10 percent at age 28 days.

3. Dry shrinkage: At age 21 days, less than concrete without water-reducing admixture.

D. Accelerating or Retarding Admixtures: Conform to ASTM C 494 for Type C or Type B.

1. Plasticizer: Conform to ASTM C 494, Type F.
2. Superplasticizers:
   a. Dynatron, as manufactured by Chem-Masters Corporation.
   b. Sikament 10 ESL, as manufactured by Chem-Masters Corporation.
   c. Plastiflow N, as manufactured by Chem-Masters Corporation.

2.4 BONDING COMPOUNDS

A. Bonding Compounds, General: Products of the following manufacturers are specified and will be acceptable provided they comply with requirements of the Contract Documents:

1. The Burke Co., Buffalo, NY (716/832-5959; local representative, Fountain Valley, CA, 714/556-4510).

2. Dayton Superior Corporation, Chemical Operations, Oregon, IL (815/732-3136 or 800/745-3707; local office, Santa Fe Springs, CA, 310/946-5504 or 800/745-3701).

3. Euclid Chemical Co., Cleveland, OH (216/531-9222 or 800/321-7628).

4. Tamms Industries Co. (A.C. Horn), Mentor, OH (216/974-2399 or 800/218-2667; local representative, Los Angeles, CA, 213/269-1846).

5. L&M Construction Chemicals, Inc., Omaha, NE (402/453-6600 or 800/362-3331).


9. BASF Building Systems, Inc. (Sonneborn brand), Shakopee, MN (952/496-6000 or 800/433-9517).

10. Stonhard, Inc., USA, Maple Shade, NJ (800/736-9300).

11. Thoro System Products, Miami, FL (800/327-1570).


B. Bonding Compound: Polyvinyl acetate, acrylic or styrene butadiene base. Provide polyvinyl acetate compound at interior locations only.

1. Polyvinyl Acetate (Interior Only):

   a. Superior Concrete Bonder by Dayton Superior Corp.
   b. Euco Weld by Euclid Chemical Co.
   c. Weld-Crete by Larsen Products Corp.
   d. Everweld by L&M Construction Chemicals, Inc.
   e. Ready Bond by Symons Corp.
2. Acrylic or Styrene Butadiene:
   a. Acrylic Bondcrete by The Burke Co.
   b. Day-Chem Ad Bond by Dayton Superior Corp.
   c. SBR Latex by Euclid Chemical Co.
   d. Hornweld by Tamms Industries Co. (A.C. Horn).
   e. Everbond by L&M Construction Chemicals, Inc.
   f. Acryl-Set by Master Builders Inc.
   g. Intralok by W.R. Meadows, Inc.
   h. Sonocrete by BASF Building Systems, Inc.
   i. Stonlock LB2 by Stonhard, Inc.
   j. Strong Bond by Symons Corp.

2.5 CURING, HARDENING AND SEALING MATERIALS

A. Specified Manufacturer: BASF Building Systems, Inc. (Sonneborn brand), Shakopee, MN (952/496-6000 or 800/433-9517).

B. Acceptable Manufacturers: Equivalent products of the manufacturers listed below will be acceptable in accordance with the "or equal" provision specified in Section 01630 - Product Options and Substitutions. Equivalent products of other manufacturers will be considered in accordance with the substitution provision specified in Section 01630 - Product Options and Substitutions.

1. The Burke Co., Buffalo, NY (716/832-5959; local representative, Fountain Valley, CA, 714/556-4510).

2. Dayton Superior Corporation, Chemical Operations, Oregon, IL (815/732-3136 or 800/745-3707; local office, Santa Fe Springs, CA, 310/946-5504 or 800/745-3701).

3. Euclid Chemical Co., Cleveland, OH (216/531-9222 or 800/321-7628).

4. Fortifiber Corp., Los Angeles, CA (213/268-6783 or 800/443-4079).

5. L&M Construction Chemicals, Inc., Omaha, NE (402/453-6600 or 800/362-3331).


9. BASF Building Systems, Inc. (Sonneborn brand), Shakopee, MN (952/496-6000 or 800/433-9517).

10. Stonhard, Inc., USA, Maple Shade, NJ (800/736-9300).

12. Thoro System Products, Miami, FL (800/327-1570).


C. Curing, Hardening and Sealing Materials, General: Provide materials suitable for concrete finish and not detrimental to materials to be applied to concrete. Materials shall be compatible with concrete admixtures, shall be recommended by manufacturer for intended use and shall comply with applicable air quality requirements of authorities having jurisdiction.

D. Concrete Curing Compounds: None specified. Concrete curing shall be by moist curing using moisture-retaining cover method only and not by using curing compounds.

E. Moisture-Retaining Cover: One of the following, complying with ASTM C 171, for moist curing of concrete. Add water-absorbing blanket-type curing material such as carpet, for placement on top of sheeting to ensure moisture retention under severe sun exposure and high heat.

1. Waterproof paper: ASTM C 171, non-staining reinforced type, Sisalkraft Orange Label by Fortifiber Corp., or equal.


3. White burlap-polyethylene sheeting: White burlap-polyethylene sheeting, Burlene brand or equal, complying with ASTM C 171, for contact with concrete surface.

F. Concrete Hardening and Sealing Compound, Natural Color Concrete: For exposed, natural color floor slabs in service areas, where indicated on the Drawings as "Sealed", as specified in Section 09615 - Concrete Floor Treatment.

G. Grout Materials for Preparation of Exposed Concrete Surfaces: Portland cement and fine sand. See grout mix specified in PART 3, following.

H. Floor Slab Cleaning Products: Provide floor cleaning agents for use prior to application of hardening and sealing compounds. Products shall be as recommended by or acceptable to manufacturer of applied products.

2.6 JOINT DEVICES, FILLER MATERIALS AND OTHER ACCESSORY PRODUCTS

A. Control (Contraction) Joints: Preformed joint materials are not required. Sawcut joints after concrete placement and finishing.

B. Exterior Joint Fillers: See Section 07900 - Joint Sealers for sealants for exterior joints. Provide fillers plain or punched for dowels, as necessary.

1. Filler at exterior, non-sealed joints: Premolded bituminous type, ASTM D 1751.

2. Filler at exterior, sealed joints: Non-bituminous rubber or cork, ASTM D 1752.

03300-8 CAST IN PLACE CONCRETE
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examination:

1. Verify that concrete cover requirements are met in formwork construction and reinforcement placement.

3.2 PREPARATION

A. Cleaning: Prepare previously-placed concrete by cleaning with steel brush, water blasting or sand blasting in accordance with California Building Code (CBC) Section 1906A.4, to expose the aggregate in the mortar matrix and provide suitable surface for bonding.

B. Bonding Agent Application: Apply bonding agent in accordance with manufacturer’s instructions and recommendations.

C. Dowelling: In locations where new concrete is to be dowelled to existing concrete, drill holes and insert dowels, packing solid with non-shrink cement or polymer (epoxy) grout, as indicated on Structural Drawings and as specified in Section 05090 - Anchors and Fasteners.

3.3 CONCRETE MIXING

A. Concrete Mixing, General: Comply with ACI 304 - Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete. Introduce and mix admixtures in compliance with manufacturer’s instructions and recommendations.

3.4 CONCRETE PLACEMENT

A. Placement and Consolidation, General: Comply with ACI 304 and as follows:

1. Schedule continuous placement of concrete to prevent the formation of cold joints.

2. Provide construction joints if concrete for a particular element or component cannot be placed in a continuous operation. Consult with Structural Engineer for design of joints prior to placing concrete.

3. Deposit concrete as close as possible to its final location, to avoid segregation.

B. Placement in Forms: Limit horizontal layers to depths which can be properly consolidated, but in no event greater than 24-inches.

1. Consolidate concrete by means of mechanical vibrators, inserted vertically in freshly placed concrete in a systematic pattern at close intervals. Penetrate previously placed concrete to ensure that separate concrete layers are knitted together.

2. Vibrate concrete sufficiently to achieve consistent consolidation without segregation of coarse aggregates.
3. Do not use vibrators to move concrete laterally.

4. Do not vibrate forms.

C. Slab Placement: Schedule continuous placement and consolidation of concrete within planned construction joints.

1. Place concrete in linear pattern between screeds. Refer to the Drawings for structural requirements for joints.

2. Create construction joints at reviewed locations, in compliance with detail indicated on Structural Drawings. Make construction joints true to line and profile. Do not radius joints.

3. Thoroughly consolidate concrete without displacing reinforcement or embedded items, using internal vibrators, vibrating screeds or roller pipe screeds.

4. Strike off and level concrete slab surfaces, using highway straightedges, darbies, or bull floats before bleed water can collect on surface. Do not work concrete further until finishing operations are commenced.

D. Hot Weather Placement: Comply with recommendations of ACI 305 when ambient temperature before, during, or after concrete placement is expected to exceed 90 degrees F (32 deg C) or when combinations of high air temperature, low relative humidity, and wind speed are such that the rate of evaporation from freshly poured concrete would otherwise exceed 0.2 pounds per square foot per hour.

1. Do not add water to approved concrete mixes under hot weather conditions.

2. Provide mixing water at lowest feasible temperature, and provide adequate protection of poured concrete to reduce rate of evaporation.

3. Use fog nozzle to cool formwork and reinforcing steel immediately prior to placing concrete.

E. Cold-Weather Placement: Comply with provisions of ACI 305 when air temperature has fallen to or is expected to fall below 40 deg F (4 deg C). Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. Uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.

2. Do not use frozen materials or materials containing frost or ice. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

F. Protection: Ensure that reinforcement, embedded products, joint fillers and joint devices are not disturbed during concrete placement.
3.5 JOINTS

A. Joints, General: Provide construction, isolation and control joints as indicated on the Drawings and as necessary to stabilize differential settlement and prevent random cracking.

B. Construction Joints, General: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Architect. Construct joints according to California Building Code (CBC) Chapter 19A, Section 1906A.4.

1. Locate construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip placements.

2. Make construction joints as indicated on the Contract (Structural) Drawings with surfaces roughened and reinforcement continued through the joint.

3. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.

4. Contact the Architect for review by Structural Engineer of design of joints, prior to placing the concrete.

3.6 FINISHING FORMED SURFACES

A. Repairs, General: Repair surface defects, including tie holes, immediately after removing formwork.

1. Remove honeycombed areas and other defective concrete down to sound concrete, cutting perpendicular to surface or slightly undercutting. Dampen patch location and area immediately surrounding it prior to applying bonding compound or patching mortar.

2. Before bonding compound has dried, apply patching mixture matching original concrete in materials and mix except for omission of coarse aggregate, and using a blend of white and normal portland cement as necessary to achieve color match. Consolidate thoroughly and strike off slightly higher than surrounding surface.

B. Unexposed Form Finish: Repair tie holes and patch defective areas. Rub down or chip off fins and other raised areas exceeding 1/4-inch height.

C. Exposed Form Finish: Repair and patch defective areas, with fins or other projections completely removed and smoothed.

1. Grout cleaned finish: Apply to surfaces indicated after all contiguous surfaces are accessible; do not clean as Work progresses.

   a. Prepare grout using 1 part portland cement, 1-1/2 parts fine sand, and enough water to produce a mixture with consistency of thick paint. Achieve grout color matching concrete surface color by blending normal and white portland cements.

   b. Wet areas to be cleaned and apply grout mixture evenly by brush or spray.

   c. Scrub surface immediately after grout application to fill minor air bubbles, using cork float or stone, and remove excess grout while it is still plastic.

   d. After initial drying, rub surface vigorously with clean burlap, and keep moist for not less than 36 hours.
2. Contiguous unformed surfaces: Strike smooth and float to a similar texture tops of walls, horizontal offsets, and other unformed surfaces adjacent to or contiguous with formed surfaces. Continue final finish of formed surfaces across unformed surfaces, unless otherwise specifically indicated.

3.7 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures for passage of Work specified in other Sections, after such Work is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on the Drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.8 CONCRETE CURING, SEALING AND PROTECTION

A. Curing, General: Comply with ACI 308. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Use moist curing (sheet) method only.

   1. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material.

   2. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Keep continuously moist for not less than 10 days.

C. Curing of Formed Surfaces: If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing by periodic water-fog spray and moisture-retaining cover.

E. Weather Protection: Protect concrete from rain and wind-driven dust and debris during curing. Protect concrete surface from premature drying. Use hot and cold weather curing procedures as necessary and in accordance with ACI 305 and ACI 306.

F. Contraction Joint Filler Installation: After construction activity has been completed and floor slab has been cleaned, clean out contraction joints, place sand fill or backer rod in joint and immediately fill with epoxy joint filler. Comply with manufacturer’s instructions and recommendations.

G. Protection: Protect concrete from marring and damage due to weather and construction activities.

   1. Protective measures shall include providing temporary coverings, as specified in Section 01500 - Temporary Facilities and Controls, and prohibiting all non-essential construction activities, including cleaning and maintenance of construction equipment.

   2. In particular, protect concrete floor slabs from oil, paint and other products which might penetrate and degrade concrete surface.
3.9 FIELD QUALITY CONTROL

A. Special Inspection: College will employ a special inspector during taking of test specimens and placing of all reinforced concrete which is required to have a structural design compressive strength in excess of 2000 psi and as required by authorities having jurisdiction.

B. Field Tests of Concrete: Perform tests in accordance with requirements of California Building Code (CBC), Section 1905A.7.

C. Coordination: Provide free access to Work and cooperate with appointed inspection and testing agency.

D. Mix Design: Submit mix design for each class of concrete to Independent Testing and Inspection Agency and to Architect for review prior to commencement of Work.

E. Field Certifications: For all concrete, provide signed copy of batch plant's certificate stating quantity of each material, amount of water, admixtures, departure time and date accompanying each load of materials or concrete. Deliver certificates to College's Representative.

F. Cement and Aggregates Testing: Field tests of cement and aggregates may be performed to ensure conformance with specified requirements.

G. Batch Plant Testing and Certification:
   1. Batch plant inspection: Provide continuous batch plant inspection according to California Building Code (CBC) Section 1929A.4 for transit-mixed concrete. Batch plant inspection costs shall be reimbursed to College by Contractor.

   1. Take four test cylinders for each 50 cubic yards, or fraction thereof, for each grade of concrete placed, with a minimum of one test for each day's placement of each grade of concrete placed.
   2. Test one cylinder at 7 days and two at 28 days after placement.
   3. Maintain fourth cylinder to be tested only if other tests fail to meet strength requirement.
   4. Take one additional test cylinder during cold weather concreting and cure it at job site under same conditions as concrete it represents.
   5. Test cold weather cylinder at 28 days.

I. Floor Slab Moisture Testing: Refer to Section 07265 - Vapor Emission Reduction System.

J. Additional Testing: Perform additional tests and analyses as required due to defective concrete, in accordance with provisions of the Conditions of the Contract.
3.10 DEFECTIVE CONCRETE

A. Defective Concrete: The following concrete will be deemed to be defective, and shall be removed promptly from the job site.

1. Concrete which is not formed as indicated, is not true to intended alignment, is not plumb or level where so intended, is not true to intended grades and levels.

2. Has voids or honeycomb that have been cut, resurfaced, or filled, unless acceptable to the Architect.

3. Has exposed reinforcement or inadequate cover over reinforcement.

4. Has sawdust, shavings, wood, or embedded debris.

5. Has moisture vapor emissions at level exceeding acceptable criteria.


B. Moisture Mitigation Measures: As specified in Section 07265 - Vapor Emission Reduction System.

C. Repairs and Replacements:

1. Defective concrete may be removed and repaired with pneumatically-placed concrete (shotcrete) or other acceptable methods, when and as directed by the Architect (Structural Engineer).

2. Where defective concrete is found after removal of the forms, remove the defective concrete, if necessary, and make the surfaces match adjacent surfaces.

3. Work uneven surfaces and angles of concrete to a surface matching adjacent concrete surfaces.

4. Removal of defective concrete shall be performed in such a manner so as to leave all reinforcement in place and undamaged.

END OF SECTION
SECTION 05090

ANCHORS AND FASTENERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Anchors and fasteners for connection to concrete and steel construction.

B. General requirements for welding of steel products.

C. Shrinkage-resistant grout and grouting of structural framing baseplates, equipment anchors and miscellaneous metal fabrications.

1.2 RELATED SECTIONS

A. Section 05505 - Miscellaneous Metal Fabrications: Fabrications to be fastened, welded and grouted.

B. Section 07620 - Sheet Metal Flashing and Trim: Fabrications from sheet metal, for weather protection.

C. Section 09905 - Field Painting: Field priming requirements applicable to areas damaged during welding and other anchoring and fastening operations at interior locations.

D. Division 15 - Mechanical: Equipment and other mechanical and plumbing components to be fastened, welded and grouted.

E. Division 16 - Electrical: Equipment, fixtures and other electrical components to be fastened, welded and grouted.

1.3 REFERENCES

A. American Welding Society (AWS):

1. AWS 01.1 - Structural Welding Code--Steel.

2. AWS D1.2 - Structural Welding Code-Aluminum.

3. AWS D1.3 - Structural Welding Code--Sheet Steel.

1.4 SUBMITTALS

A. Product Data: Submit catalog data for all standard production products.

1.5 QUALITY ASSURANCE

A. Inspection: Testing Agency will provide special inspection during all field welding, and high strength bolt installations and tightening operations, expansion bolt installations and installations of epoxy-type anchors in concrete, in accordance with California Building Code (CBC) and in accordance with requirements specified in Section 01400 - Quality Requirements.

2. Additionally, all welding inspectors shall be approved by Division of the State Architect (DSA).

3. For expansion bolts and epoxy-type anchors in concrete, comply with California Building Code (CSC) Section 1923A.3 and Division of the State Architect (DSA) - Interpretation of Regulations Document IR 19-1.

B. Welder Qualifications: Welders shall be qualified by tests as prescribed in AWS Standard Qualification Procedure, B3.0-41, to perform the type of welding required.

C. Field-Verified Dimensions: Prior to fabrication, field verify dimensions and details of construction. Immediately report variances in writing to Architect.

1.6 PROJECT CONDITIONS

A. Field Inspection of Fabricated Products: Prior to installation, inspect products for damage and verify markings and dimensions against reviewed submittals.

B. Environmental Conditions: Do not install products intended for interior locations when spaces are uncovered and unprotected from inclement weather.

C. Coordination: Coordinate metal fabrications Work with Work specified in other Sections so that related Work shall be accurately and properly joined.

PART 2 - PRODUCTS

2.1 ANCHORS, FASTENERS AND ACCESSORY MATERIALS

A. Anchors and Fasteners, General: Same material, color and finish as the metal to which applied, unless otherwise indicated.

B. Exterior Exposure: Provide stainless steel or hot-dipped galvanized, as indicated on the Drawings.

C. Type, Size and Spacing: Unless otherwise indicated, provide fasteners of type, grade and class required for intended use and sized and spaced as required for loads and substrate.

D. Screw Head, Typical: Unless otherwise noted, exposed screws shall be Phillips oval or flat head, countersunk.


F. High-Strength Threaded Fasteners:

1. Heavy hex structural bolts: ASTM A 325, Type 1, Supplementary Requirements S.1, with threads included in shear plane and marked" A 325 T," unless otherwise noted on Contract Drawings.

   a. Conform to the provisions of California Building Code ~CBC), Chapter 22A, Division IV.

   b. Manufacture with identifying mark placed on top of the head.

2. Washers:

   a. Hardened Type: ASTM F 436, Type 1, style as required.

   b. Direct Tension Load Indicating Type: ASTM F 959 Type 325 or Type 490.

4. Option: At Contractor's option the following bolts may be used with standard washers instead of direct tension load indicating type, where required:
   a. Load Indicator Bolts, manufactured by Bethlehem Steel Corporation.
   b. Tension Steel Bolts, manufactured by Bristol Machine Company.
   c. Tension Control Bolts, manufactured by Lejeune Bolt Company.

G. Threaded Rod: For threaded stud anchors, all-thread rod complying with ASTM F 1554, Grade 36 or as indicated on the Structural Drawings.

H. Lag Screws and Bolts, Steel: ANSI B18.2.1, type and grade best suited for the purpose, hexagonal or square head.

I. Plain Steel Screws: FS FF-S-85, FS FF-S-92 and FS FF-S-111; type and grade best suited for the purpose.

J. Stainless Steel Screws: AISI 300 Series.

K. Self-Drilling Metal Fasteners: TEKS by Buildex Division, Illinois Tool works, Inc.

L. Plain Steel Washers: FS FF-W-92, round, carbon steel.

M. Lock Washers: FS FF-W-84, helical spring, carbon steel.

N. Toggle Bolts: Not permitted. Depending upon substrate, use expansion anchor or use screw into appropriate backing material.

O. Concrete Anchors, Epoxy Adhesive Type: Manufacturer, product, type and size as identified on Structural Drawings. If products are not indicated on Drawings, then provide anchors as directed by the Architect (Structural Engineer) and approved by Division of the State Architect (DSA). Equivalent products of other manufacturers will be acceptable in accordance with the "or equal" provision specified in Section 01630 - Product Options and Substitutions, if approved by DSA. Comply with DSA Interpretation of Regulations Document IR 19-1.

P. Concrete and Masonry Anchors, Wedge-Type: Manufacturer, product, type and size as identified on Structural Drawings. If products are not indicated on Drawings, then provide anchors as directed by the Architect (Structural Engineer) and approved by Division of the State Architect (DSA). Equivalent products of other manufacturers will be acceptable in accordance with the "or equal" provision specified in Section 01630 - Product Options and Substitutions, if approved by DSA. Comply with DSA Interpretation of Regulations Document IR 19-1.

Q. Concrete and Masonry Anchors, Self-Threading: Manufacturer, product, type and size as identified on Structural Drawings. If products are not indicated on Drawings, then provide anchors as directed by the Architect (Structural Engineer) and approved by Division of the State Architect (DSA). Equivalent products of other manufacturers will be acceptable in accordance with the "or equal" provision specified in Section 01630 - Product Options and Substitutions, if approved by DSA. Comply with DSA Interpretation of Regulations Document IR 19-1.

R. Fiber Plugs and Screws: Not permitted.

S. Lead Expansion Shields: Not Permitted.
T. Powder-Actuated Driven Fasteners: Comply with notes on Drawings and the following.

1. Use only if acceptable to Architect (Structural Engineer), generally not permitted where not specifically indicated or in load-bearing installations; Fed Spec FF-P-395 or Fed Spec GGG-D-777; as produced by ITW Ramset/Red Head, Wood Dale, IL (708/350-0370); regional representative, City of Commerce, CA, (California) 800/368-9724 or (National) 800/227-1823 in compliance with ICC Evaluation Service, Inc. (ICC ES) Evaluation Report ER-1799.

2. Equivalent products by Hilti Corporation, Tulsa, OK (918/627-9711 or 800/879-8000), will be acceptable in accordance with the "or equal" provision specified in Section 01630 Product Options and Substitutions.

U. Welding Rods and Bare Electrodes: As indicated on (Structural) Drawings for welding of structural (load-bearing) members. If not indicated, select rods and electrodes in accordance with AWS 01.1 - Code for Welding in Building Construction, applicable to metal alloy to be welded.

2.2 GROUTING COMPOUNDS

A. Specified Manufacturers: Products of the following manufacturers are specified and will be acceptable provided they comply with referenced standards aJJ other requirements of the Contract Documents:

1. Dayton Superior Corporation, Chemical Operations, Oregon, IL (815/372-3136 or 800/745-3707; local office, Santa Fe Springs, CA, 310/946-5504 or 800/745-3701).

2. Euclid Chemical Co., Cleveland, OH (216/531-9222 or 800/321-7628).


5. W.R. Meadows, Inc., Elgin, IL (700/683-4500; local representative Walnut, CA, 909/469-2606 or 800/342-5976).


7. Sika Corporation, Lyndhurst, NJ (201/933-8800; local representative, Santa Fe Springs, CA, 310/941-0231).


B. Acceptable Manufacturers: Equivalent products of the manufacturers listed below will be acceptable in accordance with the "or equal" provision specified in Section 01630 - Product Options and Substitutions. Equivalent products of other manufacturers will be considered in accordance with the substitution provision specified in Section 01630 - Product Options and Substitutions.

1. The Burke Co., Buffalo, NY (716/832-5959; local representative, Fountain Valley, CA, 7141556-4510).

2. Larsen Products Corp., Rockville, MD (301/770-5200 or 800/633-6668).

3. Tamms Industries Co. (A.C. Horn), Mentor, OH (216/294-2399 or 800/218-2667; local representative, Los Angeles, CA, 213/269-1846).
4. Thoro System Products, Miami, FL (800/327-1570).

5. Stonhard, Inc., USA, Maple Shade, NJ (8001736-9300).


C. Metallic Shrinkage-Resistant Grout: For filling under equipment and interior miscellaneous metal fabrications; pre-mixed factory-packaged compound, metallic aggregate, minimum 5000 psi 28-day compressive strength. Confirm product selection with manufacturer's recommendations for intended use.

1. Firmix by Euclid Chemical Co.

2. Ferrogrount by L&M Construction Chemicals, Inc.

3. Embeco 636 or Embeco 885 by Master Builders Technology, Inc.


5. Ferrolith G by Sonneborn.

D. Non-Metallic Shrinkage-Resistant Grout: For filling around anchors for exterior miscellaneous metal fabrications; pre-mixed, non-metallic, non-corrosive, non-staining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with CE-CRD-C821, minimum 5000 psi 28-day compressive strength.

1. Sure Grip Grout by Dayton Superior.

2. Euco N.S. by Euclid Chemical Co.

3. Crystex by L&M Construction Chemicals, Inc.

4. Masterflow 713 or Masterflow 928 by Master Builders Technology, Inc.


E. Shrinkage-Resistant Setting Grout: For setting railing posts and similar components in sleeves or blackouts in concrete; pre-mixed, natural aggregate, minimum 5000 psi 28-day compressive strength, Master Builders Technology, Inc., Set Grout.

F. Non-Shrink Polymer (Epoxy) Grout: For setting anchor bolts in concrete.

1. For anchor bolts for structural members: Foil Fast Injection Gel Anchor System by The Rawl Plug, Inc., New Rochelle, NY (914/235-6300), or approved equal.

2. For anchor bolts for non-structural components: Polymer (epoxy) grout, Brutem MP or AS by Master Builders Technology, Inc., as recommended by manufacturer for intended use.

PART 3 - EXECUTION

3.1 PREPARATION

A. Preparation for Cutting and Fitting: Obtain Architect’s review prior to site cutting or making adjustments not indicated.
B. Welding Preparation: Clean and strip site primed steel items to bare metal where site welding is indicated.

C. Blocking and Bracing: Make provision for erection loads with temporary bracing. Keep work in alignment.

D. Coordination with Cast in Place Concrete: Furnish setting templates and place items required to be cast into concrete, as specified in Section 03200 - Reinforcing Steel.

3.2 INSTALLATION', TYPICAL

A. Installation, General: Install items plumb and level, accurately fitted, free from distortion or defects.

B. Field Welding: Perform field welding in accordance with AWS D1.1.

3.3 BASES AND BEARING PLATES

A. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.

1. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.

2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.

3. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.

4. For proprietary grout materials, comply with manufacturer’s instructions.

3.4 FIELD CONNECTIONS

A. Field Connections, General:

1. Conceal connections where possible. Otherwise, make countersinks for concealment after fabrication, except where noted.

2. Provide lugs, clips, anchors and miscellaneous fastenings necessary for complete assembly and installation.

3. Fit or miter to hairline tolerances.

4. Component parts of built-up members shall be well-pinned with closely-fitted contact.

B. Coordination: Make provisions to connect metal fabrications with or to receive Work specified in other Sections.

C. Joints Exposed to Weather or Water: Fabricate and secure joints to keep water out, or provide adequate drainage of water that penetrates.

D. Installation and Testing of Expansion Anchors:

1. Comply with anchor manufacturer’s installation instructions and conditions of approval of authorities having jurisdiction, including applicable ICC Evaluation Service, Inc. (ICC

2. Test installed expansion anchors in compliance with DSA Interpretation of Regulations Document 19-1.

3.5 ANCHORING POSTS AND RAILINGS

A. Post Anchors Grouted in Concrete: Anchor posts by forming or core-drilling holes not less than 5 inches (125 mm) deep and 3/4 inch (20 mm) greater than outside diameter of post.

1. Clean holes of all loose material, insert posts, and fill annular space between post and concrete with non-shrink grout, mixed and placed to comply with grout manufacturer's instructions and recommendations.

2. Unless otherwise indicated, leave joint at post base exposed, wipe off surplus grout material and leave 1/8-inch (3-mm) build-up, sloped away from post.

B. Posts and Railings Bolted to Substrate: Use fasteners as indicated or, if not indicated, sized to suit dead and live loads. Coordinate framing and backing installation at steel and wood framing to provide suitable supports.

1. Where indicated, make connections to concrete and masonry substrates by bolting with expansion anchors

2. Where indicated, make connections to steel shapes by through-bolting.

3. Where indicated, make connections to cold-formed steel stud or joist framing or sheet backing by screwing with sheet metal screws.

4. Where indicated, make connections wood substrates using lag bolts into wood framing or blocking.

5. Where indicated, install removable railing and fence sections in slip-fit metal sockets embedded into concrete. Accurately locate sockets to match post spacing.

6. Toggle bolts will not be acceptable.

3.6 FIELD WELDING

A. Field Welding: Weld joints, corners and seams continuously in compliance with AWS 01.1 and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

5. Re-weld to fill holes. Putties and fillers will not be accepted.

6. Do not field weld galvanized components to remain unfinished. Grind welds smooth and flush with base material.
B. Welding Inspection and Testing: Inspect and test welds during installation of load-carrying components as follows:

1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record Work required and performed to correct deficiencies.

2. Perform visual inspection of all welds.

3. Perform ultrasonic inspections of full penetration groove welds in compliance with ASTM E 164.

3.7 CLEANING AND TOUCH-UP

A. Cleaning: Perform initial cleaning immediately after completion of installation. Prepare surfaces for finish painting at interior locations as specified in Section 09905 - Field Painting and at exterior locations as specified in Section 09970 - Coatings for Exterior Steel.

B. Galvanizing Touch-Up: Touch up galvanizing immediately after installation, including after galvanizing is damaged due to field welding. Prepare surface and apply cold galvanizing compound in compliance with the manufacturer's instructions and recommendations.

C. Primer Paint Touch-Up: Immediately after erection or installation, touch up shop paint. Use products at interior locations as specified in Section 09905 - Field Painting and at exterior locations as specified in Section 09970 - Coatings for Exterior Steel.

1. Clean field welds, bolted joints, and areas where primer is damaged.

2. Clean and primer paint welds and surrounding areas affected by welding.

3. Paint with material used for shop painting, minimum 3 mils dry film thickness.

END OF SECTION
SECTION 05120

STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Structural steel framing members and structural steel support members, with required bracing, welds, and fasteners.

B. Baseplates.

C. Welded headed (shear connector) studs.

1.2 RELATED SECTIONS

A. Section 01400 - Quality Requirements: Structural steel tests and inspections.

B. Section 03200 - Reinforcing Steel: Placement of anchorages to be cast in concrete.

C. Section 05090 - Anchors and Fasteners: Grout materials for grouting of structural steel base plates.

D. Section 05505 - Miscellaneous Metal Fabrications: Steel fabrications from structural steel shapes for reinforcement and support of minor structural components.

1.3 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.

1.4 REFERENCES

A. American Institute of Steel Construction (AISC):


B. American Welding Society (AWS):

   1. AWS A2.4 - Symbols for Welding and Nondestructive Testing, Including Brazing.

   2. AWS D1.1 - Structural Welding Code - Steel.


   1. ASTM A 6 - Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use.

   2. ASTM A 36 - Specification for Structural Steel.
3. ASTM A 53 - Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.


5. ASTM A 307 - Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.

6. ASTM A 325 - Specification for High-Strength Bolts for Structural Steel Joints.

7. ASTM A 370 - Test Methods and Definitions for Mechanical Testing of Steel Products.

8. ASTM A 449 - Specification for Quenched and Tempered Steel Bolts and Studs.

9. ASTM A 490 - Specification for Heat-Treated, Steel Structural "Bolts, 150 ksi Tensile Strength.

10. ASTM A 500 - Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

11. ASTM A 572 - Specification for High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality.


15. ASTM F 436 - Specification for Hardened Steel Washers.

16. ASTM F 844 - Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.

17. ASTM F 959 - Specification for Compressible-Washer-Type Direct Tension Indicator for Use with Structural Fasteners.


   a. SP-1 - Solvent Cleaning.
   b. SP-2 - Hand Tool Cleaning.
   c. SP-3 - Power Tool Cleaning.
   d. SP-6 - Commercial Blast Cleaning.

1.5 SUBMITTALS

A. Product Data: For manufactured products, including welded stud (shear connector) anchors, submit complete manufacturer's descriptive literature and specifications.
B. Shop Drawings:
   1. Submit shop drawings describing fabrication and erection of structural steel. Shop drawings
      shall include not less than the following:
   2. Dimensioned profiles of structural members cross-referenced to plans for purposes of location.
   3. Fabrication and installation details, including details of anchorage to supporting structure.
   4. Designated shop and field welds in accordance with AWS A2.4.
   5. Indicate type of primer and finish, if applicable, to be applied to each member.
   6. Indicate size, number and spacing of welded stud (shear connector) anchors.
   7. Erection sequence drawings.

C. Quality Control Submittals: Submit the following:
   1. Design Data: Submit structural calculations signed and sealed by a structural engineer licensed
      in the State of California confirming design of connections not specifically detailed on Contract
      Drawings.
   2. Test Reports:
      a. Submit certified laboratory test reports confirming physical characteristics of materials used
         in the performance of Work specified in this Section.
   3. Certificates:
      a. Furnish mill test reports of identified stock.
      b. Submit manufacturer's certificates certifying welders employed on Project.
   4. Procedures: Submit weld procedures, indicating joint details and tolerances, preheat and
      interpass temperature, postheat treatment, single or multiple pass, electrode type and size,
      welding current, polarity and amperes and post treatment.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Conform to requirements of California Building Code (CBC), Chapter 22A, including special
      inspection provisions.
   2. Comply with applicable research report by ICC Evaluation Service, Inc. (ICC ES) for headed
      welded stud product proposed, including conditions of acceptance by Division of the State
      Architect (DSA), Structural Safety Section.

B. Special Inspection: Special inspections will be performed by Testing Laboratory in compliance with
   California Building Code (CBC) Chapter 17A, Section 1701A.5, including inspections of the following:
   1. Structural welding, in compliance with California Building Code (CBC) Section 1701A.5.5.
C. Testing: Comply with California Building Code (CBC), Chapter 22A and Section 2231A.1. Costs of testing unidentified stock shall be reimbursed to College’s Representative by Contractor.

D. Inspection:

1. Testing Laboratory will provide special inspection during all welding, and high-strength bolt installations and tightening operations, in accordance with California Building Code (CBC) and in accordance with requirements specified in Section 01400 - Quality Requirements and notes on Structural Drawings.


3. Additionally, all welding inspectors shall be approved by Division of the State Architect (DSA).


F. Industry Standards: Comply with AISC Code of Standard Practice for Steel Buildings and Bridges, except as follows:

1. Modify Paragraph 4.2.1 by deletion of the following sentence: "This approval constitutes the Owner’s acceptance of all responsibility for the design adequacy of any connections designed by the fabricator as part of his preparation of these shop drawings."

2. Delete Paragraph 4.2.2 in its entirety.

3. Modify paragraph 7.9.3 by deletion of the following sentence: "The contract documents specify the sequence and schedule of placement of such elements."

G. Qualifications:

1. Fabricator's Qualifications: Regularly engaged and specializing, for the preceding 5 years, in the fabrication of structural steel for building construction and as follows:

   a. Fabricator shall be current member in good standing of the American Institute of Steel Construction (AISC), or having a demonstrated ability to perform work in accordance with AISC standards.
   b. When required, fabricator shall be approved by Division of the State Architect (DSA).

2. Erector's Qualifications: Regularly engaged and specializing, for the preceding 5 years, in the erection of structural steel for building construction and licensed, certified, or otherwise approved in writing by the accepted fabricator.

3. Welder's Qualifications: Qualified by tests as prescribed in AWS Standard Qualification Procedure, B3.0-41, to perform the type of welding required.

H. Coordination: Provide setting drawings, templates, and directions for installation of anchor bolts and other embedded and built-in structural steel products.
1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver anchor bolts, base plates and other anchorage devices in time to be installed before the start of cast-in-place concrete operations or masonry work in which products will be embedded.

B. Storage of Materials: Store structural steel members at the Work site above ground on platforms, skids or other supports. Protect steel from corrosion. Store other materials in weather-tight and dry manner, under covers which do not entrap condensation, until ready for incorporation in the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Members, General: Tensile requirements for steel members shall conform to Table 22-1-A of California Building Standards Code (CBSC), Standard 22-1, and notes on Structural Drawings.

1. Provide steel produced by Electric Arc Furnace (EAF) method.

2. Provide steel members with postconsumer recycled content plus one-half of preconsumer recycled content is not less than 67 percent.

B. Steel Shapes, Bars, and Plates: Conform to the following, where noted on Drawings:

1. Typical wide flange members: ASTM A 572 for Grade 50 or ASTM A 992.

2. Wide flange members used in braced frame: ASTM A 992.

3. Other steel shapes, bars and plates: ASTM A 36, except ASTM A 572 Grade 50 where indicated on Structural Drawings.

C. Structural Steel Pipe and Tubing:

1. Vertical Pipe: ASTM A 53, Type S, Grade B, F_y = 35 ksi, with a maximum sulfur content of 0.06 percent.

2. Shaped Tubes (Cold-Formed): ASTM A 500, Grade B, F_y = 46 ksi, with a maximum heat analysis sulfur content of 0.05 percent.

D. Anchor Bolts: Conform to ASTM F 1554, strength as noted otherwise in Structural Drawings, including weldability Supplement S1. Provide headed type, with ASTM A 563 Grade A hexagonal nuts, unless otherwise indicated on the Contract Drawings.

E. Standard Threaded Fasteners:

1. Standard bolts: ASTM A 307, Grade A.

2. Plain washers: ASTM F 844 plain (flat) unhardened steel washers.

F. Welded Headed (Shear Connector) Studs: ASTM A 108, Grade 1015 through 1020, headed-stud type, cold-finished carbon steel, AWS D1.1, Type B, products and size as indicated on Structural Drawings.


2. Acceptable Manufacturers: None identified. Equivalent products of the manufacturers listed below will be considered in accordance with the "or equal" provision specified in Section 01630 - Product Options and Substitutions. Manufacturer shall have valid ICC Evaluation Service, Inc. (ICC ES) evaluation or research report for applications indicated on Structural Drawings.

G. Filler Metals for Welding: Weld material shall comply with AISC Specification Section J2.

1. Shielded metal arc welding: AWS D1.1, type as required for materials being welded. Provide electrodes as indicated on Structural Drawings.

H. Shop Paint Primer:

1. Exposed interior conditions and concealed conditions: Fabricator’s standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.

2. Exposed conditions: SSPC-Paint 25 BCS, Type II, iron oxide, zinc oxide, raw linseed oil, and alkyd. Provide gray color. Coordinate shop primer with requirements for primer for field-applied paint finish.

I. Non-Shrink Grout: Non-shrink, non-metallic type, 7000 psi minimum compressive strength, as specified in Section 05090 - Anchors and Fasteners.

2.2 FABRICATION

A. Shop Fabrication and Assembly, General: Fabricate structural steel in accordance with the AISC Specification and California Building Code (CBC) Chapter 22A, Division IX, Section 2251A, Chapter

1. Do not start fabrication until mill test reports for identified stock have been accepted by Architect and Shop Drawings have been reviewed.

2. Special inspection of structural steel fabrication is required unless an approved fabricator, as described in California Building Code (CBC) Chapter 17A, Section 1701A.7, is employed.

3. Furnish column bases shop-attached to columns.

4. Shop connections shall be welded.

5. Field connections shall be bolted, except where welded connections are indicated on the Contract Drawings.

6. Holes shall be standard hole diameter, except holes for anchor bolts, which may be oversize holes.

7. Clean contact surfaces immediately prior to assembly and leave unpainted.
B. Holes: Provide holes required for securing other Work to structural steel framing and for passage of other Work through steel framing members, as shown on Shop Drawings.

1. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

2. Weld threaded nuts to framing and other specialty items as indicated to receive Work specified in other Sections.

C. Shop Connections: Make shop connections by welding unless specifically noted on Structural Drawings.

1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.

2. Make welded connections by shielded-arc method in accordance with AWS D1.1.
   a. Welding shall be done in the shop unless otherwise shown or specified.
   b. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC’s "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
   c. Prior to welding, preheat members in accordance with AISC Section J2.7.
   d. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
   e. Welds exposed in the finished work shall be ground and dressed smooth to preserve the shape and profile of the welded item.
   f. Prevent surface bleeding of back-side welding on exposed steel surfaces.
   g. Grind smooth exposed fillet welds 1/2-inch (13 mm) and larger.
   h. Grind flush butt welds.

3. Inspection: All shop welding will be continuously inspected by certified inspector employed by Testing Laboratory, in compliance with California Building Code (CBC) Section 1701A.5.5.
   a. All welds not otherwise identified shall be continuous fillet welds, with size based on AISC standards for thicker part being joined.
   b. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.

4. Welding at exposed structural steel: Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Dress exposed welds.

5. Inspection: All shop welding shall be continuously inspected by certified inspector, except welding performed in shop of fabricator approved by Division of the State Architect (DSA).

D. Field Connections: Provide bolted connections, except where welded connections are indicated on Structural Contract Drawings.
2.3 SHOP PAINTING

A. Preparation: Clean surfaces of mill scale, grease, dirt, and foreign matter in accordance with SSPC SP-3, except where members will be exposed to long term exterior exposure, in accordance with SSPC SP-6.

B. Primer Paint Application:
   1. Shop paint surfaces of structural steel members with specified primer, except as follows:
      a. Structural steel members, or portions of members, to be field welded.
      b. Structural steel members, or portions of members, to be embedded in concrete specified in Section 03300 - Cast in Place Concrete.
      c. Surfaces in contact with high-strength bolts.
      d. Bearing surfaces and surfaces supporting steel decking.
      e. Structural steel that will be concealed by interior finishes.
      f. Structural steel members to be galvanized.
   2. Apply one coat of shop primer having a minimum of 1-1/2 mils dry thickness. Where structural steel is exposed in finished construction, coordinate primer with requirements for field finishes specified in Section 09905 - Field Painting, for interior locations, and in Section 09970 - Coatings for Exterior Steel, for exterior exposed locations.
   3. At inaccessible surfaces, shop paint steel surfaces not in contact, but inaccessible for painting after erection, with two coats of specified primer having a minimum of 3 mils total dry thickness.

2.4 SOURCE QUALITY CONTROL

A. Testing and Inspection, General: Refer to Section 01400 - Quality Requirements for general requirements for testing and inspection, including responsibility and cost of testing and inspection services.

B. Steel Material Testing: Determine mechanical properties in conformance with ASTM A 370 of the following materials:
   1. Structural steel shapes and tubing.
   2. Anchor bolts.
   3. Filler metals for welding.
PART 3 - EXECUTION

3.1 PREPARATION

A. Examination: Before erection proceeds, and with the steel erector present, verify elevations of concrete bearing surfaces and locations of anchorages for compliance with requirements. Do not proceed with erection until unsatisfactory conditions have been corrected.

B. Layout: Establish permanent benchmarks necessary for accurate erection of structural steel. Check elevations of concrete surfaces, and locations of anchor bolts and similar items, before erection proceeds.

C. Supports: Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

D. Temporary Supports: Provide temporary bracing and supports for all dead loads of structure and the imposed loads of erection and construction activities. Maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing. Design of temporary supports shall be the sole responsibility of the Contractor.

3.2 ERECTION

A. Erection, General: Erect structural steel in accordance with referenced AISC Specifications.

1. Accurately assemble structural steel components to the lines and elevations indicated, within the specified erection tolerances.

2. Accurately align and adjust the various members forming parts of a frame or structure after being assembled and before being fastened.

3. Fasten splices of compression members after the abutting surfaces have been brought completely into contact.

4. Clean bearing surfaces and surfaces that will be in permanent contact before the members are assembled.

5. Coordinate setting of anchor bolts and anchors, using templates, with Work specified in Section 03100 - Concrete Formwork.

6. Cranes shall not be allowed on building slab areas.

7. Place all beams with camber (natural or fabricated) up.

B. Cleaning: Clean contact surfaces immediately prior to assembly and leave unpainted.

C. Field Connections: Except where specifically indicated on (Structural) Drawings, make connections and splices with high-strength threaded fasteners.

1. Properly place and build bolts and anchor into connecting Work.
2. Bolts and anchors shall be preset by the use of templates or such other methods as may be required to locate bolts and anchors accurately.

D. Cutting of Holes: Field cutting of holes shall be made by drilling only. Burning of holes will not be permitted.

E. Splices and Field Connections: Splice members only where indicated or with Architects' written approval. Make splices and connections as indicated on Drawings.

F. Field Cuts and Alterations: Do not field cut or alter structural members without written approval of Architect.

G. Erection Tolerances: Erect individual members in conformance with AISC Specifications so that deviations from plumb, level and true alignment shall not exceed 1 in 500.

H. Field Touch-up Painting: After the erection of structural steel, prepare surfaces and apply primer paint to field connections, welds and abrasions of members specified to be painted. Use shop primer specified herein or metal primer as specified in Section 09905 - Field Painting.

3.3 FIELD WELDING

A. Field Welding: Make welds by electric shielded arc process, in compliance with applicable AWS standards. Make butt and groove welds full penetration, unless otherwise indicated.

B. Cleaning: Upon completion, remove slag and clean welds ready for inspection and painting.

C. Minimum Structural Weld Size: 3/16-inch by 1-1/2 inches or as indicated on Drawings.

D. Welding Inspection: As specified below under Article titled FIELD QUALITY CONTROL.

3.4 FIELD QUALITY CONTROL

A. Inspection of Erection: Testing Laboratory will inspect erection, field welding, and high-strength bolting. Refer to Section 01400 - Quality Requirements for qualifications of Testing Laboratory and general requirements for services by Testing Laboratory.

B. Field Inspection of Welding:

1. Field welding: Field welding of structural steel shall be continuously inspected and shall conform to the requirements of AWS D1.1.

2. Visual inspection: Testing Laboratory will visually inspect welds and be present to inspect and accept groove, single-pass, multi-pass, and penetration welding.

3. Non-Destructive Testing, Complete Penetration Groove Welds: Base metal thicker than 1-1/2 inches, when subjected to through-thickness weld shrinkage strains, shall be ultrasonically inspected for discontinuities directly behind such welds. Test shall be performed not less than 24 hours after joint completion.

4. Defective Welds: Cut out defective welds and perform remedial Work as acceptable to Structural Engineer and Authority Having Jurisdiction (AHJ).
C. Re-Inspection: After correction of deficiencies in structural steel work which inspections and test reports indicate, additional inspections and tests will be performed to confirm that structural steel complies with specified requirements. Costs of re-inspections will be paid in accordance with requirements specified in Section 01400 - Quality Requirements.

D. Certification: Testing Laboratory will:

1. Certify in writing, after completion of the work, that structure has been erected in accordance with the Contract Documents and California Building Code (CBC).

2. Certify in writing, after completion of the work, that welding has been performed in accordance with the Contract Documents and California Building Code (CBC).

3. Certify in writing, after completion of the work, that high-strength bolting has been performed in accordance with the Contract Documents and California Building Code (CBC).

4. Bolt tightness shall be checked on a minimum 10 percent of bolts, selected at random, for each high-strength bolted joint and a minimum of two bolts per joint.

3.5 ADJUSTING AND CLEANING

A. Field Touch-up Painting: After the erection of structural steel, touch-up field connections, exposed bolts, and abrasions in the prime coat with the same paint used for the shop painting. Structural members showing evidence of rusting over 25 percent of any surface after erection shall be removed and replaced.

1. At concealed conditions, touch-up primer using primer as specified in Section 09905 - Field Painting.

B. Protective Coating: After erection and field welding, wire brush scarred galvanized surfaces and apply field protective coat of American Solder and Flux Dry-Galv, or Metalloy Products Galvalloy, according to manufacturer's specifications.

C. Erection Clips: Remove temporary erection clips unless otherwise directed by Architect.

END OF SECTION
SECTION 05400

COLD-FORMED STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Cold-formed, light gage steel framing where indicated at load-bearing interior locations.

1.2 RELATED SECTIONS

A. Section 05120 - Structural Steel: Structural steel framing members.

B. Section 09110 - Non-Load Bearing Metal Framing: Light gage steel framing at interior non-bearing partitions, ceilings and furring.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's specifications, descriptive literature and load tables.

B. Erection Instructions: Submit manufacturer's erection instructions for axial and laterally loaded light gage metal framing.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Products of the manufacturers listed below will be acceptable. Equivalent products of other manufacturers will be acceptable in accordance with the "or equal" provision specified in Section 01630 - Product Options and Substitutions.


2. ClarkWestern Building Systems, Inc., Riverside, CA (951/360-3131).

3. California Expanded Metal Products Co. (CEMCO), City of Industry, CA (818/369-3564 or 714/990-6581).


B. Reference Standard: All cold-formed structural metal framing shall be designed in accordance with American Iron and Steel Institute (AISI) - Specification For the Design of Cold Formed Steel Structural Members and shall comply with ICC Evaluation Service, Inc. (ICC ES) Evaluation Report ER-4943P.
2.2 COLD-FORMED STRUCTURAL METAL FRAMING

A. Cold-Formed Structural Metal Framing: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges. Refer to metal stud notes on Structural Drawing S0.0.02.

1. Steel: Galvanized steel meeting or exceeding the minimum requirements of ASTM A 1003, galvanized finish complying with ASTM C 955, coating designation G60.

2. Steel thickness: As indicated on Drawings.

3. Minimum yield strength: As indicated on Drawings.

4. Minimum stud properties: As indicated on Drawings.

5. Painted finish: Manufacturer's standard rust-inhibitive paint. Provide either painted finish or hot-dipped galvanized finish, except as specified below.

6. Galvanized finish: Hot-dipped galvanized. Provide studs with galvanized finish at locations where interior spaces are subject to high humidity, such as toilet rooms and shower rooms.

7. Flanges: Screw-type, 2-inch (51 mm) face.

8. Web: Punched web unless otherwise indicated. Provide web punch outs 12-inches (305mm) from base and every 24-inches (610mm) thereafter.

B. Tracks, Sills and Headers: Manufacturer's standard U-shaped steel track, unpunched, with straight flanges, gage same as studs unless otherwise noted. Provide deflection-type head track specified below for top track at exterior non-bearing wall framing and interior partitions.


2. Acceptable manufacturers: None identified. Equivalent products of other manufacturers, subject to acceptance by Division of the State Architect (DSA), will be acceptable in accordance with the "or equal" provision specified in Section 01630 - Product Options and Substitutions.


C. Bridging: Type as required by manufacturer.
2.3 ACCESSORIES

A. Screws: Self-drilling, self-tapping screws, as recommended by cold-formed metal framing manufacturer for conditions of framing, or as indicated on Drawings.


C. Welding electrodes: Selected according to AWS Code for metal alloy to be welded.

D. Standard Structural Steel Shapes and Plates: ASTM A 36.

E. Miscellaneous Steel Items: ASTM A 283, grade optional.

F. Flat-Rolled Carbon Steel Sheets: ASTM A 1008.

G. Cold-Rolled Carbon Steel Sheets: ASTM A 1008.

H. Fastenings: Provide bolts, nuts, screws, clips, washers and other fasteners as necessary for proper erection of items specified herein.

I. Welding Electrodes: Selected according to AWS Code for metal alloy to be welded.

J. Galvanizing Touch-Up Finish: As specified in Section 05081 - Galvanized Finishes on Steel.

2.4 INCIDENTAL STEEL SHAPES AND FRAMING

A. Incidental Steel Shapes and Framing: Provide specified, indicated and necessary clips, plates, bent plates, angles, channels, and similar components to secure materials, equipment and items of Work specified in other Sections. This Section is not intended to specify each item of cold-formed structural metal framing individually.

PART 3 - EXECUTION

3.1 COLD-FORMED STRUCTURAL METAL FRAMING ERECTION, GENERAL

A. Erection, General: Conform to ASTM C 995 for bracing and bridging for screw application of gypsum board and gypsum sheathing.

B. Configuration: Place and align tracks and install framing to configurations shown on Drawings. Install cold-formed structural metal framing at 16-inches on center typically, unless otherwise indicated.

C. Splicing: Splicing of cold-formed structural metal framing will not be accepted.

D. Coordination: Coordinate framing with adjoining Work. Drill holes; do not punch or use cutting torch. Shearing shall leave clean lines and surfaces.

E. Cutting: Cut framing components squarely for attachment to perpendicular members or, as required, for an angular fit against abutting members.

F. Touch-Up: Clean and touch up shop galvanized and painted finishes abraded or burned out by welding.
1. At galvanized steel, use cold galvanizing compound as specified in Section 05505 - Miscellaneous Metal Fabrications.

2. At primer painted steel, use metal primer paint as specified in Section 09905 - Field Painting.

3.2 COLD-FORMED METAL STUD ERECTION

A. Runner Tracks: Securely anchor runner tracks to supporting structure as shown on Drawings.

B. Runner Track Joints: Secure abutting pieces of runner track to a common structural element or splice and butt-weld together.

C. Stud Erection:

1. Place studs in tracks plumb and aligned and securely attach to flanges of both upper and lower runner tracks. All studs shall have full bearing at lower running track.

2. Maintain clearance under building structural members to avoid deflection transfer to framing not designed to receive axial loading.

3. Provide studs not more than 2-inches from each corner of wall or abutting construction.

4. Align studs with joists and decking flutes, as applicable.

D. Vertical Movement Provisions: Provide deflection-track at head of wall under structural members to prevent transmission of vertical loads into metal wall and partition framing.

E. Bracing, General: Brace studs with bridging to make rigid. Cut bridging to fit between, and welded to, studs or inserted through cutouts in the web of each stud and secured to studs with welded clip angles. Provide bridging as indicated on the Drawings.

F. Opening Framing: Provide double studs/joists at all openings greater than 16-inches.

G. Mechanical, Plumbing and Electrical Provisions: Coordinate erection of studs/joists with installation of service utilities to minimize discontinuity in framing. Align stud web openings.

H. Recesses: Provide framed openings for all recessed components. Coordinate erection of framing with installation of bucks, anchors, backing, blocking, plumbing, mechanical and electrical components to provide necessary clearances and supports for recessed products. Coordinate erection of framing with requirements for door and window frame supports and attachments.

I. Backing and Blocking: Provide sheet metal backing as indicated and as necessary to support all products attached to wall or ceiling after completion of finish surface, or as indicated on Drawings.

1. Cut ends of runner and backing plates to each stud.

2. Fasten studs carrying the weight of wall hung items to the bottom runner.

END OF SECTION
SECTION 05505

MISCELLANEOUS METAL FABRICATIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Light structural steel framing members and structural steel support members, with required bracing, welding and fasteners.

B. Steel materials for miscellaneous metal fabrications specified in this Section and required but not specified in other Sections.

C. Characteristics, including fabrication and finish requirements for metal fabrications not otherwise specified in other Sections.

D. Shop priming of steel fabrications.

E. Miscellaneous metal fabrications, such as:
   1. Rough hardware.
   2. Sleeves for penetrations through structural members and stud partitions.

1.2 RELATED SECTIONS

A. Section 03100 - Concrete Formwork: Placement of embedded products.

B. Section 03300 - Cast in Place Concrete: Materials and methods for grouting of structural members.

C. Section 05090 - Anchors and Fasteners: Anchors and fasteners for connection to concrete and steel construction; shrinkage-resistant grout and grouting of structural framing baseplates, equipment anchors and miscellaneous metal fabrications.

D. Section 07620 - Sheet Metal Flashing and Trim: Fabrications from sheet metal, for weather protection.

E. Section 09905 - Field Painting: Field priming; field-applied finish on interior metal fabrications.

F. Division 15 - Mechanical: Piping and ductwork supports; component and equipment anchorage.

G. Division 16 - Electrical: Electrical supporting devices; component and equipment anchorage and attachment.
1.3 REFERENCES

A. Aluminum Association (AA):
   1. AA - Standards for Architectural Aluminum.
   2. AA - Designation System for Aluminum Finishes.

B. American Hot Dip Galvanizers Association (AHDDA): Structures Recommended Details for Galvanized

C. American Institute of Steel Construction (AISC):
   1. AISC Manual of Steel Construction.

D. American Welding Society (AWS):
   1. AWS A2.4 - Symbols for Welding and Nondestructive Testing, Including Brazing.
   2. AWS D1.1 - Structural Welding Code - Steel.
   3. AWS D1.2 - Structural Welding Code - Aluminum.
   4. AWS D1.3 - Structural Welding Code - Sheet Steel.


      a. SP-1 - Solvent Cleaning.
      b. SP-2 - Hand Tool Cleaning.
      c. SP-3 - Power Tool Cleaning.
      d. SP-6 - Commercial Blast Cleaning.

1.4 SUBMITTALS

A. Product Data: Submit catalog data for all standard production products.

B. Shop Drawings:
   1. Indicate fabrication and installation of metal fabrications.
   2. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
   3. Include erection drawings, elevations, and details where applicable.
5. For products indicated to comply with certain design loadings, include structural analysis data sealed and signed by a Professional Structural Engineer registered to practice in the State of California, who was responsible for their preparation.

C. Product Data: Submit catalog data for all standard production products.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Conform to California Building Code (CBC), Chapter 20A and Chapter 22A for load-bearing metal fabrications.

B. Fabricator’s Qualifications: Fabricator of light structural steel framing members and other miscellaneous metal fabrications of structural character shall be approved by Division of the State Architect (DSA) in accordance with applicable California Building Code (CBC) provisions.

D. Special Inspection: Special inspection of structural welding will be performed by Testing Laboratory in compliance with California Building Code (CBC) Chapter 17A, Chapter 20A and Chapter 22A.

E. Welder's Qualifications: Welding shall be performed by certified welders qualified in accordance with procedures specified in applicable referenced AWS standard, using materials, procedures and equipment of the type required for the Work. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone re-certification.

F. Coordination: Provide templates and sleeves for incorporation of embedded items into Work specified in other Sections.

G. Coordination: Provide templates and sleeves for incorporation of embedded items into the Work specified in other Sections.

H. Field-Verified Dimensions: Prior to fabrication, field verify dimensions and details of construction. Immediately report variances in writing to Architect.

1.6 PACKAGING, DELIVERY, STORAGE AND HANDLING

A. Storage, General: Store products in enclosed, well-ventilated spaces, not in contact with soil or vegetation and not subject to inclement weather.

B. Delivery, Storage and Handling, Galvanized Products:
   1. Stack and bundle during transport and store to allow air flow between galvanized surfaces.
   2. Load for transport to permit continuous drainage should wetting occur.
   3. Do not rest galvanized products on cinders or clinkers.
1.7 PROJECT CONDITIONS

A. Field Inspection of Fabricated Products: Prior to installation, inspect products for damage and verify markings and dimensions against reviewed submittals.

B. Environmental Conditions: Do not install products intended for interior locations when spaces are uncovered and unprotected from inclement weather.

C. Coordination: Coordinate metal fabrications Work with Work specified in other Sections so that related Work shall be accurately and properly joined.

PART 2 - PRODUCTS

2.1 FERROUS METALS

A. Ferrous Metal Surfaces, General: For metal fabrications exposed to view upon completion of the Work, provide ferrous metals materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.

B. Steel Shapes: Steel plates, bars, angles, channels and H-sections: ASTM A 572 Grade 50 or ASTM A 36.

C. Steel Tube:
   2. Cold-formed: ASTM A 500.

D. Steel Pipe: ASTM A 53 (black steel and hot-dip galvanized).

E. Steel Sheet:
   1. For structural uses: Hot-rolled, ASTM A 570; cold-rolled, ASTM A 611.
   2. For nonstructural uses: Cold-rolled, ASTM A 366; hot-rolled, ASTM A 569.

F. Steel for Galvanized Products:
   1. Structural shapes, plates and bars: From fully killed or semi-killed steel, ASTM A 36 or ASTM A 572, except silicon content in the range 0 to 0.4 percent or 0.15 to 0.25 percent, as applicable, only.
   2. Steel bolts and nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
   3. Sheet steel: ASTM A 526, with ASTM A 525, Coating Designation G90, for precoated sheet; ASTM A 569 or ASTM A 570 for sheet used in fabrications.
   4. Steel for pipe and tubing: ASTM A 53, ASTM A 120 or ASTM A 595 Grade A or B.
2.2 ANCHORS, FASTENERS AND ACCESSORY MATERIALS

A. Anchors and Fasteners, General: Comply with general requirements specified in Section 05090 - Anchors and Fasteners. Unless otherwise indicated, provide fasteners of type, grade and class required for intended use and sized and spaced as required for loads and substrate. Provide stainless steel fasteners at stainless elements and other elements at exterior locations.

B. Welding Rods and Bare Electrodes: As indicated on (Structural) Drawings for welding of structural (load-bearing) members. If not indicated, select rods and electrodes in accordance with AWS D1.1 - Code for Welding in Building Construction, applicable to metal alloy to be welded.

C. Grouting Compounds: Comply with requirements specified in Section 05090 - Anchors and Fasteners.

D. Shop Primer Paint: Zinc-rich primer complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat and complying with applicable air quality regulations for VOC content.

   1. Shop primer, general: Coordinate primer with finish paints and coatings, as applicable, to provide sound foundation for field-applied topcoats despite prolonged exposure during construction. Refer to Section 09905 - Field Painting, for interior locations, and Section 09970 - Coatings for Exterior Steel, for exterior conditions.

E. Field Primer and Finish Paints: As specified in Section 09905 - Field Painting, for interior locations, and Section 09970 - Coatings for Exterior Steel, for exterior conditions.

2.3 METAL FABRICATIONS, GENERAL

A. Metal Fabrications, General: Provide metal fabrications of shapes and sizes indicated for profiles shown.

   1. Where specific sizes are not indicated, provide materials of sufficient size, thickness and type to provide necessary strength and durability.

   2. Thickness of metal, details of metal, details of assembly and support shall give ample strength and stiffness for the intended purpose.

   3. Provide brackets, flanges and anchors of cast or formed metal of the same type material and finish fabricated product, unless otherwise indicated.

   4. For exterior fabrications, allow for thermal movement in the design, fabrication, and installation of metal fabrications, to prevent buckling, opening up of joints, and over stressing of welds and fasteners. Accommodate temperature range of 100 degrees F.

B. Preparation Before Fabrication: Remove loose mill scale and rust and remove twists and bends in manners not injurious to materials and finishes.

C. Fabrication: Fabricate and finish metal items in accordance with the Drawings and reviewed shop drawings.

   1. Contractor shall verify measurements before fabrication.
2. Hot-dip galvanize fabricated ferrous items after fabrication. Field connections shall be bolted or screwed where possible. Avoid field cutting and welding which damage galvanized coating. Comply with requirements specified in Section 05081 - Galvanized Finishes on Steel.

3. Fabricate and shop-assemble in largest practical sections for delivery to site.

4. Prepare and reinforce fabrications as required to receive applied items.

D. Cutting and Fitting: Fabricate with accurate angles and surfaces, true to the required lines and levels and as required to suit installation conditions.

1. Fabricate items with joints tightly fitted and secured.

2. Make exposed joints tight, flush, and hairline.

3. Punch, drill and ream in manner to leave clean, true lines and surfaces.
   a. Oversize hole 1/16-inch by punching, when material thickness is equal to or less than bolt diameter plus 1/8-inch.
   b. Sub-punch 1/16-inch smaller than bolt and drill or ream to oversize by 1/16-inch, when material thickness is thicker than bolt diameter plus 1/8-inch.

4. Gas cutting of steel will be acceptable where stress will not be transmitted through flame-cut surfaces.
   a. Make cuts clean and to contour.
   b. Deduct 1/8-inch from effective width of members cut by torch.

5. Cut, reinforce, drill and tap metal fabrications as necessary to receive finish hardware, screws, and similar items.

6. Provide cutouts, fittings, and anchorage provisions as required for coordination of assembly and installation with other Work.

E. Edges: Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work. Remove sharp or rough areas on exposed traffic surfaces.

F. Welding: Comply with AWS D1.1. Weld corners and seams continuously to comply with AWS recommendations and the following:

1. Do not field weld galvanized components to remain unfinished. Perform welding prior to galvanizing.

2. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

3. Obtain fusion without undercut or overlap.

4. Remove welding flux immediately.
5. At connections in exposed steel fabrications, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.
   a. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Dress exposed welds.
   b. Welds exposed in the finished work shall be ground and dressed smooth to preserve the shape and profile of the welded item.
   c. Prevent surface bleeding of back-side welding on exposed steel surfaces.
   d. Grind butt welds flush.
   e. Grind or fill exposed fillet welds to smooth profile.

6. Re-weld to fill holes. Putties and fillers will not be acceptable.

G. Coordination: Make provisions to connect metal fabrications with or to receive work specified in other Sections.

H. Connections, General: Component parts of built-up members shall be well-pinned with closely-fitted contact. Conceal connections where possible. Otherwise, make countersinks for concealment after fabrication, except where noted.

I. Joints, General: Fit or miter to hairline tolerances. Provide lugs, clips, anchors and miscellaneous fastenings necessary for complete assembly and installation. Component parts of built-up members shall be well-pinned with closely fitted contact.
   1. Joints on finished surfaces: Provide welds ground smooth and filled.
   2. Joints exposed to weather or water: Fabricate to keep water out, or provide adequate drainage of water that penetrates.

J. Steel Tubing and Piping Fabrication: Unless otherwise indicated, close ends with plate stock so there are no exposed ends of tubing or piping. Grind all edges smooth.

K. Mechanical Finishes: Complete finishing prior to fabrication wherever possible.
   1. After fabrication, finish all joints, bends, abrasions, and other surface blemishes to match finish.
   2. Protect finish on exposed surfaces by using temporary protective covering.

L. Sheet Metal Joints: Hem exposed edges.
   1. Bolted and Screwed Connections: Provide holes and connections for Work specified in other Sections.
   2. Use bolts for field connections only.
   3. Draw all nuts tight and nick threads of permanent connections.
   4. Use beveled washers where bearing is on sloped surfaces.
   5. Where screws must be used for permanent connections in ferrous metal, use flat head type, countersunk, with screw slots filled and finished smooth and flush.
M. Embedded Fabrications: For embedment in concrete, provide weld-on lugs or anchors as detailed or as necessary.

N. Brazing: Brazing shall be of adequate strength and durability with joints tight and flush, smooth and clean. All exposed surfaces shall be ground and finished flush, free of brazing discoloration and other marks. Brazing on finished surfaces shall be indistinguishable from parent metal.

O. Light Structural Steel Framing Fabrications: Unless otherwise indicated, fabricate units from structural steel shapes, plates, and steel bars, with continuously welded joints and smooth exposed edges.

1. General: Design of fabrications shall be by licensed Professional Engineer, registered in the State of California. Fabricate structural steel members in accordance with AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings and in compliance with Uniform Building Code (CBC), Chapter 22A.

2. Shop Connections: Make welded connections by shielded-arc method in accordance with AWS D1.1.
   a. For load-bearing fabrications, comply with requirements specified in Section 05120 - Structural Steel.
   b. Welding shall be performed in shop unless otherwise shown or specified.
   c. Prior to welding, preheat members in accordance with AISC Section J2.7.
   d. All welds not otherwise identified shall be continuous fillet welds, with size based on AISC standards for thicker part being joined.
   e. Grind and dress smooth all welds exposed in finished Work to preserve shape and profile of welded item.

3. Welding Inspection: For load-bearing fabrications, shop welding shall be continuously inspected by certified inspector, except welding performed by an approved fabricator, as required by California Building Code (CBC) Chapter 17A, Section 1701A.7.

4. Field Connections: Provide bolted connections, except where welded connections are indicated.

5. Column Bases: Provide base plates shop welded to columns.

6. Weld Finishing: Grind and dress smooth all welds exposed in finished Work to preserve shape and profile of welded item.

7. Shop Painting: Shop prime all light structural steel fabrications, except fabrications to be encased in concrete. Apply one-coat shop primer paint system in accordance with SSPC Paint System PS 7.01. Coordinate with field-applied primers and finishes specified in Section 09905 - Field Painting, for interior locations, and Section 09970 - Coatings for Exterior Steel, for exterior conditions. Prime as specified below.
   a. Plain steel: Tnemec Series 90-97 Tneme-Zinc, two-component catalyzed epoxy coating (2.5-3.5 mils DFT).

P. Steel Tubing and Piping Fabrications: Close ends with plate stock, no exposed ends; grind edges.
Q. Shop Assembly: Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly.

1. Disassemble units only as necessary for shipping and handling limitations.
2. Use connections that maintain structural value of joined pieces.
3. Clearly mark units for reassembly and coordinated installation.

2.4 SHOP PAINTING

A. Shop Priming and Painting, General: Conform to SSPC Painting Manual. Primers shall be compatible with topcoats. Coordinate with requirements specified in Section 09905 - Field Painting, for interior conditions, and Section 09970 - Coatings for Exterior Steel, for exterior conditions.

B. Products to be Primed: Shop-apply primer paint after fabrication of all metal fabrications, except as follows.

1. Do not shop prime portions of metal fabrications to be embedded in concrete or mortar.

C. Preparation for Priming: Prepare all surfaces to be coated, as follows.

1. Solvent-clean in accordance with SSPC-SP 1.
2. Exterior fabrications: Clean in accordance with SSPC-SP 5, SSPC-SP 6, SSPC-SP 8, or SSPC-SP 10.
3. Interior fabrications: Clean in accordance with SSPC-SP 3, SSPC-SP 5, SSPC-SP 6, SSPC-SP 8, or SSPC-SP 10.

D. Shop Priming: Comply with SSPC-PA 1. Coordinate with requirements specified in Section 09905 - Field Painting, for interior conditions, and Section 09970 - Coatings for Exterior Steel, for exterior conditions.

1. Apply primer immediately following surface preparation.
2. Do not prime surfaces to be welded.
3. Do not prime surfaces in direct contact bond with concrete or mortar.
4. Spray apply shop prime without holidays, drips, runs.
5. Provide two coats where product will not be finish painted or will be concealed in completed work.
6. Apply an additional coat to corners, welds, edges, and fasteners.

E. Drying: Allow paint to dry before handling.

F. Steel Embedded in Concrete: Coat concealed faces with bituminous coating.
G. Shop-Applied Finish Painting: Apply thermosetting enamel paint, gloss or semi-gloss, of a type and color as selected and approved by Architect, if not otherwise specified.

1. Shop applied finish paint shall be baked to set and cure.
2. Allow finish paint to thoroughly dry and cure before handling.

2.5 ROUGH HARDWARE

A. Rough Hardware, General: Provide bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as indicated on Drawings.

B. Rough Hardware Fabrication: Fabricate items to sizes, shapes, and dimensions required. Provide malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

2.6 SLEEVES

A. Sleeves: Fabricated from steel pipe as indicated on Drawings and specified for plumbing, mechanical and electrical Work.

B. Diameter: See Structural Drawings for additional requirements. Diameter shall be such that sleeve provides required clearance for components passing through it, including thermal insulation and firestopping materials.

C. Sleeves Through Concrete and Masonry: Fabricate sleeve from standard weight steel pipe, galvanized after fabrication where below grade or exposed to weather or wet or damp conditions.

2.7 OTHER FABRICATIONS

A. Other Fabrications: Provide fabrications not specifically described but required for a complete and proper installation, as selected by the Contractor, subject to review by Architect.

PART 3 - EXECUTION

3.1 PREPARATION

A. Preparation for Cutting and Fitting: Obtain Architect's review prior to site cutting or making adjustments not indicated.

B. Welding Preparation: Clean and strip site primed steel items to bare metal where site welding is indicated.

C. Blocking and Bracing: Make provision for erection loads with temporary bracing. Keep work in alignment.

D. Coordination with Cast in Place Concrete: Furnish setting templates and place items required to be cast into concrete, as specified in Section 03200 - Reinforcing Steel.
3.2 INSTALLATION, TYPICAL

A. Installation, General: Install items plumb and level, accurately fitted, free from distortion or defects.

B. Bolted and Screwed Connections to Building Substrates: As specified in Section 05090 - Anchors and Fasteners.

C. Field Welding: Perform field welding in accordance with AWS D1.1 and requirements specified in Section 05090 - Anchors and Fasteners. Load-bearing fabrications will be continuously inspected by Testing Laboratory in compliance with California Building Code (CBC) Section 1701A.5.

3.3 CLEANING AND TOUCH-UP

A. Cleaning: Perform initial cleaning immediately after completion of installation. Prepare surfaces for finish painting as specified in Section 09905 - Field Painting, for interior conditions, and Section 09970 - Coatings for Exterior Steel, for exterior conditions.

B. Primer Paint Touch-Up: Immediately after erection or installation, touch up shop paint. Use products as specified in Section 09905 - Field Painting, for interior conditions, and Section 09970 - Coatings for Exterior Steel, for exterior conditions.

1. Clean field welds, bolted joints, and areas where primer is damaged.

2. Clean and primer paint welds and surrounding areas affected by welding.

3. Field prime with metal primer specified in Section 09905 - Field Painting, for interior conditions, and Section 09970 - Coatings for Exterior Steel, for exterior conditions, minimum 3 mils dry film thickness.

C. Painting of Metal Fabrications:

1. Exposed exterior ferrous metal fabrications shall be coated (painted) as specified in Section 09970 - Coatings for Exterior Steel.

2. Exposed interior ferrous metal fabrications shall be painted as specified in Section 09905 - Field Painting.

3. Concealed ferrous metal fabrications shall be painted with factory primer, touched up as specified herein and in Section 09905 - Field Painting.

END OF SECTION
SECTION 07620

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Flashing and sheet metal components for building construction:
   1. Roof and sill flashings.
   2. Counterflashings over bituminous base flashings.

B. Counterflashings over roofing base flashings.

C. Counterflashings at roof mounted mechanical equipment and vent stacks.

D. Counterflashings for plumbing, mechanical, electrical and other roof penetrations.

E. Factory-manufactured pipe penetration boots.

1.2 RELATED SECTIONS

A. Section 05090 - Anchors and Fasteners: General requirements for anchors and fasteners to building substrates.

B. Section 05505 - Miscellaneous Metal Fabrications: Requirements for fasteners; metal fabrications from steel and aluminum sheet and plate.

C. Division 15 - Mechanical: Flashing sleeves and collars for mechanical and plumbing items protruding through roofing membrane and exterior walls.

D. Division 16 - Electrical: Flashing sleeves and collars for electrical items protruding through roofing membrane and exterior walls.

1.3 REFERENCES

A. National Roofing Contractors Association (NRCA):
   1. NRCA - Roofing and Waterproofing Manual.
   2. NRCA - Steep Roofing Manual.

B. Sheet Metal and Air Conditioning Contractors National Association (SMACNA) - Architectural Sheet Metal Manual.

1.4 SUBMITTALS

A. Product Data: For Hashing, sheet metal, and accessories; manufacturer's technical product data, installation instructions and general recommendations for each specified sheet material and fabricated product.
B. Shop Drawings:

1. Indicate layout, material profiles, methods of joining, and fastening and anchorages details, and installation details.

2. Include major counterflashings, trim/fascia units and expansion joint systems.

3. Describe material profile, jointing pattern, jointing details, fastening methods, and installation details.

4. Provide layouts at 1/4" = 1'-0" scale minimum and details at 3" = 1'-0" scale minimum.

5. Scaled manufacturer's catalog data may be submitted for factory fabricated items.

1.5 QUALITY ASSURANCE

A. Sheet Metal Fabricator and Installer: Company specializing in sheet metal Hashing and trim work with minimum of five years of verifiable, experience on commercial and institutional projects.

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery: Package and protect materials during shipment to avoid dampness and staining. Uncrate and inspect materials for damage, dampness, and staining upon delivery to the Project site. Remove from the site and replace damaged materials that cannot be restored to like-new condition.

B. Storage: Store materials in dry, weather-tight, ventilated areas until immediately before installation. Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

C. Handling: Handle sheet metal items to avoid damage to surfaces, edges, and ends.

1.7 PROJECT CONDITIONS

A. Coordination: Coordinate Work specified in 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

2.1 SHEET METAL FLASHING AND TRIM MATERIALS

A. Sheet Metal Materials, General: Meet or exceed minimum requirements and recommendations of reference standards.

B. Zinc-Coated (Galvanized) Steel: Commercial quality sheet steel with 0.20 percent copper, ASTM A526 except ASTM A527 for lock-forming; Coating Designation G60 hot-dip galvanized typically and G90 for parapet caps and concealed gutters, mill phosphatized where indicated for painting; 24 gage minimum except as otherwise indicated or recommended by SMACNA Architectural Sheet Metal Manual or as follows:


2. Parapet caps: 22 gage.
C. Stainless Steel: AISI Type 302 or 304, complying with ASTM A167, 20 finish, fully annealed, dead-soft temper, except where harder temper required for forming or performance; 0.0156-inch thick (28 gage) except as otherwise indicated. Provide smooth finish typically.

D. Zinc Sheet and Strip: ASTM B69, Type I, minimum 0.024-inch thick.

2.2 ACCESSORY MATERIALS

A. Accessory Materials: Provide accessory materials and other items essential to complete the sheet metal installation. Metal accessories shall be made of the same materials as the items to which they are applied.

B. Underlayment: Flashing sheet (noted as "flexible flashing" on Drawings), as specified in Section 09253 - Gypsum Sheathing, self-adhesive, self-sealing SBS modified asphalt core laminated to cross-laminated, high-density polyethylene film reinforcement with a siliconized paper release sheet. Asphalt saturated roofing felt (commonly referred to as #15 and #30 felt) will not be acceptable.


D. Fasteners, General: Use roofing nails typically.

   1. Sheet steel fasteners: Galvanized steel or stainless steel.
   
   2. Fasteners to wood substrate: Refer to Section 06105 - Miscellaneous Carpentry for requirements. See details on Drawings. Use full-threaded screws unless otherwise indicated.
   
   3. Fasteners to concrete, masonry and metal substrates: Refer to Section 05090 - Anchors and Fasteners for requirements. See details on Drawings.
      a. Use threaded concrete and masonry anchors typically at concrete and solid masonry substrates.
      b. Use self-drilling, self-threading fasteners typically at metal substrates.

E. Solder:

   1. For use with steel: ASTM B 32, Grade Sn50, used with rosin flux.
   
   2. For use with stainless steel: ASTM B 32, Grade Sn60, used with an acid flux of type recommended by stainless-steel sheet manufacturer; use a noncorrosive rosin flux over tinned surfaces.

F. Flux: FS O-F-506, or equal.

G. Shop Primer Paint:

   1. Shop primer for ferrous metal at exposed exterior locations: Tnemec 90E-92, ethyl silicate zinc-rich primer, or equal.
   
   2. Shop primer for ferrous metal at concealed exterior locations and for interior locations: Tnemec Series 10, modified alkyd rust-inhibitive primer, or manufacturer's or fabricator's standard, fast curing, lead-free, universal modified alkyd primer, complying with performance requirements of FS TI-P-645.
   
H. Field Primer and Finish Coating: As specified in Section 09970 - Coatings for Exterior Steel.

I. Bituminous Coating: Tnemec 46-450 Heavy Tnemocel, high-build mineral-filled coal tar pitch coating, or a cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers.

J. Mastic Sealant: Polyisobutylene; non-hardening, non-skinning, non-drying, non-migrating sealant, as specified in Section 07900 - Joint Sealers.

K. Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed and complying with requirements for joint sealants as specified in Section 07900 - Joint Sealers.

L. Epoxy Seam Sealer: 2-part non-corrosive metal seam cementing compound, recommended by metal manufacturer for exterior/interior non-moving joints including riveted joints.

M. Adhesives: Type recommended by flashing sheet manufacturer for waterproof/weather-resistant seaming and adhesive application of fishing sheet.

N. Elastic Flashing Filler: Closed-cell polyethylene or other soft closed-cell material recommended by elastic fishing manufacturer as filler under fishing loops to ensure movement with minimum stress on fishing sheet.


P. Pipe Penetration Boots: Alumi-Flash pipe penetration boots, as manufactured by Portals Plus, Inc., Bensenville, IL (630/766-5240 or 8001774-5240), consisting of formed aluminum base and stepped neoprene boot. Provide size and configuration to suit roof slope and penetrating element, in accordance with manufacturer's instructions and recommendations and details on the Drawings.

Q. Miscellaneous Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of the Work, matching or compatible with material being installed, non-corrosive, size and gage required for performance.

2.3 FABRICATION

A. Shop Fabrication, General: Shop-fabricate sheet metal to greatest extent possible. Comply with details shown on Drawings and with applicable requirements of referenced standards and other recognized industry practices to accommodate local climatic considerations.

1. Fabricate sheet metal for waterproof and weather-resistant performance, with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the Work.

2. Fabricate sheet metal items of the materials specified below. Form sheet metal Work to fit substrates.

3. 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.

4. Form pieces and sections in longest practical lengths, true to shape, accurate in size, square, and free from distortion or defects.

5. Typically, provide sheet metal items in 8- to 10-foot lengths. Single pieces less than 8-feet long may be used to connect to factory-fabricated inside and outside corners, and at ends of runs.

6. Fabricate vertical faces with bottom edge formed outward 114-inch and hemmed to form drip.
B. Edges: Hem exposed edges on underside 1/2-inch. Miter and seam corners.

C. Corners: Fabricated from one piece with minimum 18-inch long legs; lock seam and solder for rigidity.

D. Seams: Typically fabricate non-moving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.

E. Configurations: As indicated on Drawings and as referenced to SMACNA Architectural Sheet Metal Manual.

F. Expansion Provisions: Where lapped or bayonet-type expansion provisions in sheet metal Work cannot be used or would not be sufficiently waterproof and weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with mastic sealant (concealed within joints).

G. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of sheet metal Work, form metal to provide for proper installation of elastomeric sealant, in compliance with referenced SMACNA standards.

H. Cleats and Starter Strips: Fabricated of same material as sheet metal fabrication, minimum 4-inches wide, except at continuous strips, interlockable with sheet metal fabrication. Typically use continuous strips.

I. Exposed Sheet Metal Items: Galvanized sheet steel.

J. Metal Separations: Provide for separation of metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

K. Standard Products: Standard production products, conforming substantially to details and design as shown, intended, or as required to provide continued watertightness, are acceptable for counterflashing, reglets, gravel stops, copings and edging in stock patterns.

2.4 REGLETS

A. Specified Manufacturer: Fry Reglet Corporation, Alhambra, CA (818/289-4744).

B. Acceptable Manufacturers: Equivalent products of the manufacturers listed below will be acceptable.
   
   
   2. MM Systems Corporation, Tucker, GA (404/938-7570 or 800/241-3460).

C. Reglets and Flashing, General: Springlok Flashing, as manufactured by Fry Reglet Corporation, formed metal reglet with snap-in metal counter-Hashing, factory-fabricated, with a minimum opening of 1/4-inch and a depth of 1-1/4 inches.
   
   1. Reglet material: Galvanized steel.
   
   2. Flashing material: 0.020-inch Type 302 stainless steel.
   
   
   4. Corners: Provide built-up mitered corner pieces for internal and external angles.
   
   5. Wind clips: Provide Fry Windlok Clip, sheet metal clips to be secured to wall prior to installing Hashing in reglet, and to be bent up over bottom edge of Hashing.
D. Surface-Applied Reglets: Fry Springlok Flashing System Type SM.

E. Recessed Reglets, in Exterior Wall Finish: Fry Springlok Flashing System Type ST.

F. Mounting Provisions: Provide slotted mounting holes spaced 16-inches on center for fastening reglet to wall.

G. Accessories:
   2. Splices: Factory-manufactured, integral component of reglet and flashing system.

2.5 SHEET METAL FINISHES

A. Sheet Metal Finish: Unless otherwise indicated, all exposed exterior sheet metal is intended to receive painted finish.

B. Preparation: Shop prepare metal surfaces for field painting by bonderizing or priming. Pretreat galvanized metal as recommended by primer paint manufacturer.

C. Priming: All exposed sheet metal, except stainless steel and shop finished metal, is intended for field finish painting. Shop prime all sheet metal to receive field finish coating. Exposed surfaces shall be ready for field finish coating as specified in Section 09970 - Coatings for Exterior Steel.

D. Backpriming: Backpaint concealed metal surfaces with bituminous coating, to a minimum dry film thickness of 15 mils.

E. Fasteners: Exposed fasteners shall match finish of surrounding material.

PART 3 - EXECUTION

3.1 PREPARATION

A. A Preparation:

B. Field measure site conditions prior to fabricating Work.

C. Install starter and edge strips, and cleats before starting installation.

3.2 INSTALLATION, GENERAL

A. Locations and Details: As indicated on Drawings. If conditions are not indicated, generally provide sheet metal flashing in the angles formed where roof decks abut walls, curbs, ventilators, pipes, or other vertical surfaces and wherever indicated and necessary to make the Work watertight and weathertight.

B. Installation, General: Except as otherwise indicated, conform to Drawing details and with referenced SMACNA - Architectural Sheet Metal Manual details. If details or conditions are not indicated, comply with standard details and recommended practices in SMACNA - Architectural Sheet Metal Manual, and referenced industry standards. For proprietary products, conform to manufacturer's installation instructions and recommendations.

   1. Make lines, profiles, arrises, and angles accurate, sharp and true. Make corners square, surfaces true and straight in planes.
2. Exposed surfaces shall be free from visible wave, warp, and buckle, and tool marks. Fold back exposed edges neatly to form a 1/2-inch hem on the concealed side. Make sheet metal exposed to the weather watertight with provisions for expansion and contraction.

3. Anchor sheet metal fabrications 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.

4. Install sheet metal flashing and trim with laps, joints, and seams that will be permanently watertight and weatherproof. Provide lapped and sealed joints only where indicated and where acceptable to the Architect.

5. Seal metal joints watertight. Apply plastic cement compound between metal flashings and felt flashings.

C. Cleats and Starter Strips:

1. Provide cleats for sheet metal where indicated and also where sheet metal is 18-inches and over in width.

2. Unless continuous cleat is indicated, space cleats evenly not over 12-inches on center, unless otherwise specified or indicated.

3. Unless otherwise specified, cleats shall be not less than 2-inches wide by 3-inches long and of the same material and thickness as the sheet metal being installed.

4. Secure one end of the cleat with two fasteners, with cleat folded back over the fastener head.

5. Lock the other end into the seam.

6. Pre-tin cleats for soldered seams.

D. Flanges: Bed flanges of sheet metal fabrications in a thick coat of bituminous roofing cement where required for waterproof performance.

E. Seams: Straight and uniform in width and height with no solder showing on the face.

1. Flat-lock seams: Finish not less than 314-inch wide.

2. Lap seams: Finish soldered seams not less than one-inch wide. Overlap seams, not soldered, shall be not less than 3-inches wide.

3. Loose-lock expansion seams: Not less than 3 inches wide; provide minimum 1-inch movement within the joint. Completely fill the joints with the specified sealant, applied at not less than 1/8-inch thick bed. Sealants are specified in Section 07900 - Joint Sealers.

4. Standing seams: Not less than one inch high, double locked without solder.

5. Flat seams: Make seams in the direction of the flow.

F. Bolts, Rivets, and Screws: Install bolts, rivets, and screws where indicated or necessary. Provide compatible washers to protect surface of sheet metal and to provide a watertight connection.
G. Fastening: Restrict screwing and nailing of sheet metal generally to sheet metal having a maximum width of 18-inches.

1. Confine screwing and nailing of flashing to one edge only.

2. Space fasteners evenly not over 3-inches on centers and approximately 1/2-inch from edge, unless otherwise specified or indicated.

3. Face fastening will not be accepted at locations exposed to public view.

H. Soldering: Do not solder factory-finished sheet metal.

1. Clean and flux metals in seams before soldering.

2. Pre-tin edges of sheet metals before soldering.

3. Solder immediately after application of the flux. Slowly solder with well-heated soldering irons so as to thoroughly heat the seams and completely sweat the solder through the full width of the seam.

4. Solder metal joints watertight for full metal surface contact.

5. Upon completion of soldering, thoroughly clean sheet metal of acid flux residue, using a neutralizing solution of washing soda in water, and rinse with clean water.

I. Expansion Control: Provide for expansion and contraction of sheet metal as recommended in reference standards.

1. Sheet metal shall accommodate thermal expansion and contraction resulting from an ambient temperature differential of 120 degrees F, which may result in a metal surface temperature range of 180 degrees F, without causing buckling, excessive stresses on structural elements or fasteners, stresses on glazing, failure of seals, reduction of performance, or other detrimental effects on appearance and performance.

2. Provide expansion and contraction control joints at not more than 40-foot intervals typically, except for copings, gravel stops and other roof edge terminations.

3. For copings, gravel stops and other roof edge terminations, provide expansion and contraction control joints at 10 feet on center maximum.

4. Space joints evenly.

5. Where the distance between the last expansion joint and the end of the continuous run is more than half the required interval, provide an additional joint.

J. Expansion Joints Installation: Screw flanges of expansion joint units to curb nailers, at maximum spacing of 6-inches on center. Fabricate seams at joints between units with minimum 3-inch overlap, to form a continuous, waterproof system.
K. Protection from Contact with Dissimilar Materials:

1. Metal surfaces: Paint surfaces in contact with mortar, concrete, stone or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.

2. Dissimilar metals: Apply 7-1/2 mil minimum dry film thick coating of bituminous paint to each contacting face of dissimilar metals, for net 15 mil minimum thickness of coating.

3. Wood or other absorptive materials: Paint surfaces that may become repeatedly wet and in contact with metal with heavy coat of bituminous coating.

3.3 FLASHINGS AND COUNTERFLASHINGS INSTALLATION

A. Flashings Installation, General: Fit flashings tight in place. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations approved by Architect.

B. Reglets Installation: Install.reglets true to lines and levels, located minimum 7-inches above cant at high point of roof decks. Install reglets to receive counterflash in manner and by methods indicated.

1. Where shown in concrete, coordinate installation with Work specified in Division 3 - Concrete.

2. Where shown in exterior insulation and finish system or other acrylic or cementitious finish, coordinate installation with applicable Section in Division 7 - Thermal and Moisture Protection or Division 9 - Finishes.

3. Seal top of surface-applied reglets with sealant, as specified in Section 07900 - Joint Sealers.

C. Counterflashings Installation: Install counterflashings to form tight fit, either by snap-in seal arrangement or by securing in place with lead wedges spaced 18-inches on center maximum. Pack remaining spaces with lead wool.

1. Except where indicated or specified otherwise, insert counterflashings in reglets, extending down vertical surfaces over upturned vertical leg of base flashings not less than 3-inches.

2. Form counterflashings to required shapes before installation.

3. Lengths of metal counterflashings shall not exceed 10 feet.

4. Where stepped counterflashings are required, counterflashings may be installed in short lengths or may be of the preformed one-piece type.

5. Provide factory- or shop-form corners not less than 12-inches from the angle.

6. Provide end laps in counterflashings not less than 3-inches and make laps weather-tight with sealant.

7. Turn up concealed edge of counterflashings built into concrete and masonry walls not less than 1 1/4-inch and extend not less than 2-inches into wall.

8. Fold exposed edges of counterflashings 1/2-inch.

9. Install counterflashings to provide a spring action against base flashing.
D. Thru-Wall Flashing:

1. Start flashing 1/2-inch behind exposed face of wall and extend through wall.

2. Lap-seam joints and seal with sealant.

3. Provide sealant around penetrations through flashing.

E. Flashing at Low-Slope Roof Penetrations and Equipment Supports: Provide metal flashing for all pipes, ducts, and conduits projecting through roof surfaces and for equipment supports, guy wire anchors, and similar items supported by or attached to the roof deck. Goose-necks, rainhods, power roof ventilators, and other plumbing, HVAC and electrical products are specified in Division 15 - Mechanical and Division 16 - Electrical, as appropriate.

1. Roof Penetration Flashing:

   a. Clear roofing surface at penetrating element.

   b. Set boot over penetrating element, cutting stepped neoprene boot as necessary to suit size of penetrating element.

   c. Prime surfaces and set metal flange in bituminous plastic cement at roofing.

   d. Strip in metal flange to roofing according to roofing manufacturer's instructions and recommendations, making watertight seal.

2. Equipment Support and Pad Flashing:

   a. Fully cap support and pad.

   b. Overlap base flashing 4-inches.

   c. Lap and solder joints.

   d. Provide sealant around penetrations through fishing.

3.4 SCUPPERS AND OVERFLOWS INSTALLATION

A. Scuppers and Overflows Installation:

1. Mechanically fasten and solder joints.

2. Fold outside edges under 1/2-inch on all sides.

3. Join the bottom edge to closure flange, where necessary, and form ridge to act as a gravel stop around scupper inlet.

4. Coat interior of scuppers and overflows with bituminous plastic cement.

3.5 CLEANING AND PREPARATION FOR FIELD PAINTING

A. Soldered Joints Treatment: As sheet metal installation progresses, neutralize excess flux with 5 to 10 percent washing soda solution, and thoroughly rinse.

B. Mitigation: Repair or replace damaged and deformed sheet metal.
C. Cleaning: Wash down exposed surfaces and remove stains, scrap and debris such that sheet metal is ready to receive field painting and related Work. Make sheet metal ready for finishing as specified in Section 09970 - Coatings for Exterior Steel.

3.6 PROTECTION

A. Protection: Protect sheet metal flashings and trim during remainder of construction to ensure that Work will be without damage or deterioration other than natural weathering at time of Substantial Completion review.

END OF SECTION
SECTION 07710
MANUFACTURED ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SECTION INCLUDES
A. Factory-manufactured reglets and counterflashing.

1.2 RELATED SECTIONS
A. Section 05505 - Miscellaneous Metal Fabrications: General requirements for anchors and fasteners.
B. Section 07620 - Sheet Metal Flashing and Trim: Shop-fabricated sheet metal Work.

1.3 SUBMITTALS
A. Product Data: Submit manufacturer's complete descriptive literature and specifications.
B. Installation Instructions: Submit manufacturer's installation instructions and recommendations. Include instructions for the particular products and conditions of Project.

1.4 QUALITY ASSURANCE
A. Coordination: Coordinate installation of reglets and counterflashing with installation of built-up roofing.

PART 2 - PRODUCTS

2.1 REGLETS AND COUNTERFLASHING
A. Specified Manufacturer: Fry Reglet Corporation, Alhambra, CA (626/289-4744 or 8001237-9773).
B. Acceptable Manufacturers: Equivalent products of the manufacturers listed below will be acceptable in accordance with the "or equal" provision specified in Section 01610 - Basic Product Requirements. Equivalent products of other manufacturers will be considered in accordance with the substitution provision specified in Section 01630 - Product Substitution Procedures.

2. MM Systems Corporation, Tucker, GA (404/938-7570 or 800/241-3460).
C. Reglets and Counterflashing, General: Spring 10k Flashing, as manufactured by Fry Reglet Corporation, formed metal reglet with snap-in metal counter-flashing, factory-fabricated, with a minimum opening of 1/4-inch and a depth of 1-1/4 inches.

1. Reglet material: Galvanized steel.
2. Flashing material: 0.020-inch Type 302 stainless steel.
4. Corners: Provide built-up mitered corner pieces for internal and external angles.
5. Wind clips: Provide Fry Windlok Clip, sheet metal clips to be secured to wall prior to installing flashing in reglet, and to be bent up over bottom edge of flashing.

D. Surface-Applied Reglets, on Concrete Walls: Fry Springlok Flashing System Type SM.

E. Recessed Reglets, in Exterior Wall Finish: Fry Springlok Flashing System Type ST.

F. Mounting Provisions: Provide slotted mounting holes spaced 16-inches on center for fastening reglet to wall.

G. Accessories:
   2. Splices: Factory-manufactured, integral component of reglet and flashing system.

2.2 ACCESSORY MATERIALS

A. Accessory Materials: Manufacturer's standard anchors, fasteners, set screws, spacers, seals and filler materials, adhesive, and other accessories compatible with material in contact, as indicated or required for complete installations.

B. Anchors and Fasteners: Comply with general requirements specified in Section 05090 - Anchors and Fasteners. Unless otherwise indicated, provide fasteners of type, grade and class required for intended use and sized and spaced as required for loads and substrate.
   1. For fastening galvanized steel to concrete substrate: Zinc-coated (galvanized) or stainless steel. Steel with cadmium-plating or other rust-inhibitive coating, except at aluminum materials provide.
   2. For fastening aluminum: Stainless steel only.

C. Screw Heads, Typical: Unless otherwise noted, exposed screws shall be Phillips oval or flat head, countersunk.

D. Bituminous Coating: Tmemec 46-450 Heavy Tmemecol, high-build mineral-filled coal tar pitch coating, or a cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Field verify dimensions, substrate conditions and requirements for built-up roofing and other related components.

3.2 INSTALLATION

A. Anchorages: Coordinate anchoring devices for material types and installation conditions. Comply with requirements specified in Section 05090 - Anchors and Fasteners.
   1. Provide anchorage devices and fasteners where necessary for securing manufactured roof accessories to in-place construction, including threaded fasteners with drilled-in expansion shields for masonry and concrete where anchoring members are not embedded in concrete.
   2. Provide fasteners of metal, type, and size to suit type of construction indicated and provide for secure attachment of manufactured roof accessories.
3. Provide conceal fasteners where practicable.

4. Space exposed screws evenly and symmetrically.

B. Cutting, Fitting and Placement:

1. Perform all cutting, drilling, and fitting required for installation of manufactured roof accessories.

2. Install manufactured roof accessories in true alignment and proper relationship to adjoining surfaces.

3. Allow adequate free movement for thermal expansion and contraction of metal to avoid buckling.

4. Securely attach components in place with all required accessories and fasteners.

5. Locate anchors at interval recommended by manufacturer, but not less than 3-inches from each end and not more than 24-inches on center.

6. Assemble components to exclude water from top of exterior wall and to serve as counter-flashing at termination of built-up roofing.

C. Joinery and Continuity:

1. Maintain continuity of manufactured roof accessories, with minimum number of joints and metal members aligned mechanically using splicing components.

2. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal to avoid buckling of finish surfaces.

3. Adhere flexible filler materials (if any) to coping components with adhesive or pressure-sensitive tape, as recommended by manufacturer.

D. Isolation: Protect concealed metal surfaces installed in contact with dissimilar metal or corrosive substrates, such as concrete. Apply heavy coat of bituminous coating on metal contact surfaces or provide other permanent separation as recommended by metal product manufacturer.

3.3 REGLETS AND COUNTERFLASHING INSTALLATION

A. Reglets Installation: Install reglets true to lines and levels, located minimum F-inches above cant at high point of roof decks. Install reglets to receive counterflashing in manner and by methods indicated.

1. Where shown in concrete, coordinate installation with Work specified in Division 3 - Concrete.

2. Where shown in exterior insulation and finish system or other acrylic or cementitious finish, coordinate installation with applicable Section in Division 7 - Thermal and Moisture Protection or Division 9 - Finishes.

3. Seal top of surface-applied reglets with sealant, as specified in Section 07900 - Joint Sealers.

B. Counterflashings Installation: Install counterflashing in reglets to form tight fit, either by snap-in seal arrangement or by securing in place with lead wedges spaced 18-inches on center maximum. Pack remaining spaces with lead wool.
1. Except where indicated or specified otherwise, insert counterflashings in reglets, extending down vertical surfaces over upturned vertical leg of base flashings not less than 3-inches.

2. Form counterflashings to required shapes before installation.

3. Lengths of metal counterflashings shall not exceed 10 feet.

4. Where stepped counterflashings are required, counterflashings may be installed in short lengths or may be of the preformed one-piece type.

5. Provide factory- or shop-form corners not less than 12-inches from the angle.

6. Provide end laps in counterflashings not less than 3-inches and make laps weathertight with sealant.

7. Turn up concealed edge of counterflashings built into concrete and masonry walls not less than 1/4-inch and extend not less than 2-inches into wall.

8. Fold exposed edges of counterflashings 1/2-inch.

9. Install counterflashings to provide a spring action against base flashing.

3.4 CLEANING AND PROTECTION

A. Protection: Provide protective covers to prevent marring and soiling of completed interior joint covers. Remove strippable protective material when finish Work in adjacent areas is complete and joint covers when no longer subject to subsequent construction damage or soiling.

B. Cleaning: When protective material is removed, clean exposed metal surfaces to comply with manufacturer’s instructions.

END OF SECTION
SECTION 07900

JOINT SEALERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Exterior joints sealers in vertical surfaces and nontraffic horizontal surfaces.

B. Interior joints in vertical surfaces and horizontal nontraffic surfaces.

1.2 RELATED SECTIONS

B. Section 03300 - Cast in Place Concrete: Contraction joint filler at concrete slabs on grade.

D. Section 07620 - Sheet Metal Flashing and Trim: Use of products specified in Section 07900 - Joint Sealers for sealing of sheet metal joints.

F. Section 09250 - Gypsum Board: Sealing concealed perimeter joints of gypsum drywall partitions to reduce sound transmission characteristics.

G. Section 09905 - Field Painting: Use of painter's caulk for preparation of surfaces to receive field finish paint.

I. Division 15 - Mechanical: Plumbing and HVAC system penetrations shall be sealed with products specified in Section 07900 - Joint Sealers.

J. Division 16 - Electrical: Electrical penetrations shall be sealed with products specified in Section 07900 - Joint Sealers.

1.3 SYSTEM DESCRIPTION

A. Joint Sealer Work for Weather Tightness: Work includes all interior and exterior calking and sealing required to make building weathertight and includes calking and sealing wherever expansion and contraction occurs and between materials and products which could lead to infiltration of moisture, water, light or air blown particles into building.

B. Joint Sealer Work for Acoustical Control: Work includes interior calking and sealing required to stop airborne sound transmission through building assemblies.

C. Joint Sealer Work for Moisture Control: Work includes interior calking and sealing to fill openings and seams to prevent moisture penetration.

D. Joint Sealer Work for Appearance: Work includes interior calking and sealing to neatly trim and fill openings prior to painting.

E. Definition: The terms sealant and calking shall be considered synonymous.
1.4 REFERENCES

A. Sealant, Waterproofing and Restoration Institute (SWRI) - Sealants: The Professionals Guide.

1.5 SUBMITTALS

A. Product Data: Each joint sealant product required. Indicate sealant chemical characteristics, performance criteria, limitations, color availability.

B. Samples: For color selection by Architect. If stock colors are not acceptable, provide custom colors as directed by Architect.

C. Installation Instructions: Instructions for joint preparation and joint sealer application. Note all deviations from SWRI recommendations.

1.6 QUALITY ASSURANCE


1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver materials in original, tightly sealed containers or unopened packages with manufacturer's name, labels, product identification, lot numbers (where appropriate), color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.

B. Storage and Handling: Store and handle materials in compliance with manufacturers' instructions and recommendations, to prevent their deterioration or damage due to moisture, high and low temperatures, contaminants, or other causes. Store materials out of weather in original containers or unopened packages as recommended by manufacturer.

1.8 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer or below 40 degrees F.

2. When joint substrates are wet.

B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

D. Project Conditions:

1. Do not install solvent curing sealants in enclosed building spaces.

2. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.
1.9 SEQUENCING AND SCHEDULING

A. Sequencing and Scheduling: Sequence installation of joint sealers to occur not less than 21 nor more than 30 days after completion of waterproofing, unless otherwise indicated.

1.10 WARRANTY

A. Extended Warranty: Provide three year warranty from date of Substantial Completion, including coverage of installed sealants and accessories which fail to achieve air tight and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. Colors: Custom colors as directed by Architect, to match or suit surrounding finish materials or to match Architect's samples. Multiple colors will be required, to suit various finish materials, as directed by Architect.

2.2 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C920 requirements, including those referenced for Type, Grade, Class, and Uses.

B. One-Part Neutral-Curing Silicone Sealant (Sealant Types 1A and 1B): Type S, Grade NS, Class 25; suitable for Uses T, NT, M, G, A, and, as applicable to joint substrates indicated, O.

1. Sealant Type 1A: Dow Corning 790 Silicone Building Sealant. No substitutions will be considered.

2. Sealant Type 1B: Dow Corning 795 Silicone Building Sealant, by Dow Corning Corp., GE Silpruf by General Electric Company, or Pecora 895 by Pecora Corporation.

C. One-Part Mildew-Resistant Silicone Sealant (Sealant Type 2): Type S, Grade NS, Class 25; suitable for Uses NT, G, A, and, as applicable to non-porous joint substrates indicated, O; formulated with fungicide; intended for sealing interior joints with non-porous substrates and subject to in-service exposure to conditions of high humidity and temperature extremes; Dow Corning 786 Mildew Resistant Silicone Sealant, by Dow Corning Corp. or GE Silicones 1700 Sanitary Sealant, by General Electric Company or 898 Silicone, by Pecora Corporation.

D. One-Part Moisture-Cured Polyurethane (Sealant Type 3): Type M, Grade NS, Class 25, Sikaflex -2c NS/SL by Sika Corporation or Sonneborn SL-2 by Sonneborn Building Products.
2.3 LATEX JOINT SEALANTS

A. Acrylic-Emulsion Sealant (Sealant Type 4): Manufacturer's standard, one part, non-sag, mildew-resistant, acrylic-emulsion sealant complying with ASTM C834, formulated to be paintable and recommended for exposed applications on interior and on protected exterior locations involving joint movement of not more than plus or minus 5 percent, one of the following:

2. AC-20, by Pecora Corp.
4. Tremco Acrylic Latex 834, by Tremco Inc.

2.4 JOINT SEALANTS FOR PAVING

A. Specified Manufacturer: Pecora Corporation, Dallas, TX (214/348-5313 or 800/233-9754).

B. Acceptable Manufacturers: Equivalent products of other manufacturers, including those listed below, will be acceptable in accordance with the "or equal" provision specified in Section 01630 - Product Options and Substitutions.


C. Two-Component Paving Joint Sealant (Sealant Type 5): DynaTred manufactured by Pecora Corporation, two-component, chemically-curing, cold-applied elastomeric sealant, traffic grade, self-leveling and non-sag, ASTM C 920 Type M, Grade NS, Class 25, suitable for Use T.

1. Consistency: Gun-grade.
2. Shore A hardness: 40 +.

D. Primer: Pecora P-75 or P-150.

E. Paving Joint Sealant Color: As selected by Architect from manufacturer's full color selection.

2.5 JOINT SEALANT BACKING

A. Joint Sealant Backing, General: Provide sealant backings of material and type which are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, non-waxing, non-extruding strips of flexible, non-gassing plastic foam of material indicated below; non-absorbent to water and gas; and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

1. Specified Manufacturer and Product: Applied Technologies, Inc., Sof Rod, proprietary, reticulated, closed-cell polymeric foam, non-outgassing, with a density of 2.5 pcf and tensile strength of 35 psi per ASTM D1623, and with water absorption less than 0.02 gms/cc in accordance with ASTM C1083.

2. Acceptable Manufacturer and Product: None identified. Equivalent products of other manufacturers will be considered in accordance with the "or equal" provision specified in Section 01630 - Product Options and Substitutions.

C. Elastomeric Tubing Joint Fillers: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056, non-absorbent to water and gas, capable of remaining resilient at temperatures down to -26 degrees F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.6 JOINT FILLERS FOR PAVING

A. Joint Fillers for Paving, General: Provide joint fillers of thickness and widths indicated.


2.7 MISCELLANEOUS MATERIALS

A. Primer: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealer-substrate tests and field tests.

B. Cleaners for Non-porous Surfaces: Provide non-staining, chemical cleaners of type which are acceptable to manufacturers of sealants and sealant backing materials, which are not harmful to substrates and adjacent non-porous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.

C. Masking Tape: Provide non-staining, non-absorbent type compatible with joint sealants and to surfaces adjacent to joints.
PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:

1. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; old joint sealers; oil; grease; waterproofing; water repellents; water; surface dirt; and frost.

2. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.

3. Remove laitance and form release agents from concrete.

4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile; and other non-porous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.

5. Start of joint sealant Work shall constitute acceptance of conditions of Work of other trades.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION OF JOINT SEALERS

A. Installation of Joint Sealers, General: Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C962 for use of joint sealants as applicable to materials, applications and conditions indicated.


D. Latex Sealant Installation Standard: Comply with requirements of ASTM C790 for use of latex sealants.
E. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

F. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

1. Install joint fillers of type specified, to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.
   a. Do not leave gaps between ends of joint fillers.
   b. Do not stretch, twist, puncture, or tear joint fillers.
   c. Remove absorbent joint fillers which have become wet prior to sealant application and replace with dry material.
   d. Install joint backing so that joint depth is 50 percent of joint width, but a minimum of 1/4-inch deep, and a maximum of 1/2-inch.
   e. Install backer in straight sections, from corner to corner. Do not bend backer around corners. Compress backer sections at ends to avoid pull-back.

2. Install bond breaker tape between sealants and joint fillers, compression seals, or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure.

3. Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers.

G. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.

H. Tooling of Non-Sag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

1. Provide concave joint configuration in conformance to Figure 6A in ASTM C962, unless otherwise indicated.

2. Provide flush joint configuration in conformance to Figure 6B in ASTM C962, where indicated. Use masking tape to protect adjacent surfaces of recessed tooled joints.

3. Provide Recessed joint configuration in conformance to Figure 6C in ASTM C962, of recess depth and at locations indicated.

I. Installation of Pre-Formed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer’s directions for installation methods, materials, and tools which produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer’s recommendations.

JOINT SEALERS
3.3 CLEANING AND PROTECTION

A. Progress Cleaning: Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

1. Clean joints by mechanical means or with solvent as recommended by sealant manufacturer and compatible with finish material, to eliminate soiling and overlap on adjacent surfaces.

2. Clean adjacent soiled surfaces.

B. Repairs: Repair or replace defaced or disfigured finishes caused by joint sealer Work.

C. Protection: Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes.

1. Joint sealers shall be without deterioration or damage at Completion review.

2. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that and installations with repaired areas are indistinguishable from original work.

3.4 EXTERIOR JOINTS IN VERTICAL SURFACES AND NON-TRAFFIC HORIZONTAL SURFACES

<table>
<thead>
<tr>
<th>Location</th>
<th>Sealant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joints in cast in place concrete and masonry.</td>
<td>Sealant Type 1B.</td>
</tr>
<tr>
<td>Joints between portland cement plaster or masonry and door frames, window frames, penetrating structural members, louvers and windows.</td>
<td>Sealant Type 1B.</td>
</tr>
<tr>
<td>Joints between portland cement plaster and door frames, window frames, penetrating structural members, louvers and windows.</td>
<td>Sealant Type 1A.</td>
</tr>
<tr>
<td>Control and expansion joints in soffits and overhead surfaces.</td>
<td>Sealant Type 1A or Type 1B.</td>
</tr>
<tr>
<td>Exposed joints within sheet metal copings, flashings and trim and windows.</td>
<td>Sealant Type 1B. Sealant Type 5.</td>
</tr>
</tbody>
</table>
### 3.5 INTERIOR JOINTS IN VERTICAL SURFACES AND HORIZONTAL NON-TRAFFIC SURFACES

<table>
<thead>
<tr>
<th>Location</th>
<th>Sealant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joints at cast-in-place concrete and masonry.</td>
<td>Sealant Type 1A or Type 1B.</td>
</tr>
<tr>
<td>Perimeter joints between interior wall surfaces and frames of exterior doors and windows.</td>
<td>Sealant Type 1A or Type 1B.</td>
</tr>
<tr>
<td>Perimeter joints between interior wall surfaces and frames of interior doors and windows.</td>
<td>Sealant Type 4.</td>
</tr>
<tr>
<td>Tile control and expansion joints.</td>
<td>Sealant Type 2.</td>
</tr>
<tr>
<td>Perimeter joints at plumbing fixtures, countertops, piping penetrations (other than firestopping and smoke seal).</td>
<td>Sealant Type 2.</td>
</tr>
<tr>
<td>Piping, duct and structural penetrations of fire rated wall, ceiling and floor assemblies.</td>
<td>As specified in Section 07840 - Firestopping and Smoke Seals.</td>
</tr>
</tbody>
</table>

**END OF SECTION**
SECTION 09110
NON-LOAD BEARING METAL FRAMING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Lightgage metal stud framing for gypsum board attachment at interior walls and partitions.

B. Related backing and bridging.

1.2 RELATED SECTIONS

A. Section 05090 - Anchors and Fasteners: General requirements for anchors and fasteners building substrates.

B. Section 05505 - Miscellaneous Metal Fabrications: Steel shapes and formed plates for securing light gage metal framing and furring.

C. Section 09250 - Gypsum Board: Requirements for metal framing support for attachment of gypsum board panels

D. Section 09510 - Acoustical Panel Ceilings: Suspended T-bar grid system.

E. Division 15 - Mechanical: General requirements for framing accommodations for HVAC, fire protection and plumbing components.

F. Division 16 - Electrical: General requirements for framing accommodations for electrical power, lighting and signal systems.

1.3 REFERENCES

A. Metal Lath/Steel Framing Association (MUSFA) - Specifications for Metal Lathing and Furring.

1.4 SUBMITTALS

A. Product Data: Metal framing 20 gage and heavier.

1.5 DELIVERY, STORAGE AND HANDLING

A. Delivery: In original unopened packaging or bundles, with manufacturer's labels intact and legible.

B. Storage: For metal studs, in enclosed shelter providing protection from damage and exposure to weather, elevated above soil and concrete on wood sleepers.

C. Handling: Promptly remove damaged or deteriorated products from site.

1.6 PROJECT CONDITIONS

A. Environmental Conditions: In cold weather and during plaster and gypsum board application and finishing, maintain temperature within building between 55 degrees F and 70 degrees F.

PART 2 - PRODUCTS
2.1 MANUFACTURERS

A. Acceptable Manufacturers: Products of the manufacturers listed below will be acceptable. Equivalent products of other manufacturers will be considered in accordance with the "or equal" provision specified in Section 01630 - Product Options and Substitutions.

1. California Expanded Metal Products Co. (CEMCO), City of Industry, CA (818/369-3564).
3. Dietrich Metal Framing, Pittsburgh, PA (412/281-2805).
5. Clark Western Building Systems, Riverside, CA (951/360-3500).

2.2 LIGHT GAGE METAL FRAMING

A. Framing Members (Studs/Joists): ASTM C 645, minimum yield strength 33 ksi, types, sizes and gage (thickness) as indicated on Drawings and as required to meet span and deflection limitations, punched web unless otherwise indicated, with screw-type flanges.

1. Typical interior, non-bearing members: 0.0312 inch (0.79 mm) thick base steel thickness minimum.
2. Jamb studs at door and window openings: 0.0677 inch (1.72 mm) thick base steel thickness minimum.

B. Tracks, Sills and Headers: Unpunched channels sized for stud flanges, base metal thickness same as studs unless otherwise noted. Provide deflection-type head track specified below for top track at exterior non-bearing wall framing and interior partitions.

2. Acceptable manufacturers: None identified. Equivalent products of other manufacturers, subject to acceptance by Division of the State Architect (DSA), will be acceptable in accordance with the "or equal" provision specified in Section 01630 - Product Options and Substitutions.


D. Screws: As recommended or required by manufacturer, self-drilling, self-tapping in accordance with manufacturer's recommendations and MUSFA specifications.

2.3 ACCESSORIES

A. Backing Plates: Steel sheet for backing for attachment and support of products attached to wall or ceiling, covering full width of stud spacing by 4-inches wide minimum.

2. Minimum base metal thickness: 0.0677 inch (1.72 mm).
3. Flat-Rolled Carbon Steel Sheets: ASTM A 611.

5. Proprietary backing: At Contractor's option, provide 3-in-One formed sheet steel angle with attachment flanges, manufactured by A J Steel Service, Inc., or equal, rated to minimum 250 pound load, 4-inch face height by depth to suit stud width.

B. Cold-Rolled Channel Bridging: 0.0538-inch (1.37-mm) bare steel thickness, with minimum 1/2-inch (12.7-mm) wide flange.
   1. Depth: 1-1/2 inches (38.1 mm).
   2. Clip angle: 1-1/2 by 1-1/2 inch (38.1 by 38.1 mm), 0.068-inch (1.73-mm) thick, galvanized steel.

C. Other Fasteners: Provide all bolts, nuts, screws, clips, washers and any other fastenings necessary for proper erection of items specified herein. See Section 05090 - Anchors and Fasteners for general requirements for anchors and fasteners to building substrates.

PART 3 - EXECUTION

3.1 LIGHT GAGE METAL FRAMING ERECTION

A. Track Installation: Place and align tracks in configurations shown.
   1. Secure top, bottom and side tracks at maximum 24-inches on center to structure using fasteners as specified in Section 05090 - Anchors and Fasteners.
   2. Provide flexible head track where framing up under beams, joists and decking, to prevent transfer to non-load bearing framing. Comply with manufacturer's instructions and recommendations and details indicated on the Drawings.

B. Studs and Joists Installation: Install studs/joists at 16-inches on center typically, unless otherwise indicated. Studs at gypsum board walls and partitions shall be placed so that their flanges point in the same direction.
   1. Do not splice studs and joists.
   2. Provide studs not more than 2-inches from each corner of wall or abutting construction.
   3. Place 18 gage and heavier studs with bottom bearing solidly on bottom of track to transfer axial loads from stud to underlying structure.
   4. Provide double studs/joists at all openings.
      a. At window jambs, provide nested studs, doubled studs or specified heavy gage single framing members.
      b. At door openings, provide doubled studs using specified heavy gage framing members.
   5. Coordinate erection of studs/joists with installation of service utilities to minimize discontinuity in framing. Align stud web openings.
   6. Maintain clearance under building structural members to avoid deflection transfer to non-load bearing framing.
   7. Brace studs/joists to make rigid. Install interlocking bridging member through stud web openings at all studs 7-feet 6-inches in length or greater.
C. Built-in Components: Provide framed openings for all built-in and recessed components.

1. Coordinate erection of framing with installation of bucks, anchors, backing, blocking, plumbing, mechanical and electrical components to provide necessary clearances and supports.

2. Coordinate erection of framing with requirements for door and window frame supports and attachments.

D. Openings and Recesses: Provide framed openings for all recessed components. Coordinate installation of framing with requirements for door and window frame supports and attachments.

E. Backing Installation: Install sheet metal backing as indicated and as necessary to support all products attached to wall or ceiling after completion of finish surface, including toilet and bath accessories, plumbing and electrical fixtures, electrical panels, toilet partitions, casework, hardware, handrails and trim. If used, install proprietary formed sheet steel backing in compliance with manufacturer’s instructions and recommendations.

F. Bracing Installation: Install bracing at studs/ joists to make rigid. Do not install cross-bracing at double stud walls and partitions unless acceptable to Architect, to preserve acoustical quality of assembly.

END OF SECTION
SECTION 09250

GYPSUM BOARD

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Gypsum board applied by screwing to framing and furring.
B. Drywall trim, fasteners and accessories.
C. Taping and finishing.
D. Drywall acoustical sealants.

1.2 RELATED SECTIONS

A. Section 07900 - Joint Sealers: Joint filler (calking) at gypsum board trim and acoustical sealants.
B. Section 09110 - Non-Load Bearing Metal Framing: Framing requirements for attachment of gypsum board finish.
C. Section 09905 - Field Painting: Primer and finish paint applied to gypsum board.

1.3 REFERENCES

A. Gypsum Association (GA):

1. GA-201 - Gypsum Board for Walls and Ceilings.
2. GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board.

1.4 SUBMITTALS

A. Shop Drawings: Submit only for alternative partition, wall and ceiling systems in lieu of the indicated systems. Indicate tested assembly number and testing agency. Indicate methods of framing, type and size of framing members and proposed methods of securing gypsum board to these members.

B. Application Procedures: Submit written description of procedures to be followed where fire- and acoustical-rated work is being done and where alternative assemblies are proposed, including illustration and identification of fire rated design (listing agency and assembly number).

C. Product Data: Submit only for alternative products, manufacturers' product data for all materials proposed for use. Include manufacturer's required and recommended application instructions for materials.

D. Field Samples: At locations mutually agreed upon with the Architect, produce samples of each gypsum board finish, demonstrating the range of texture available. Modify procedures and produce additional samples as directed to obtain finishes acceptable to the Architect. Accepted samples shall become the quality basis by which gypsum board finishes throughout the project will be judged.
1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Conform to California Building Code (CBC), Chapter 7 and Chapter 25.

B. Fire Resistance Rating: Certain wall, partition, ceiling, and furring constructions of gypsum wallboard systems are required to meet fire resistive requirements of applicable building Codes. Construction which forms component parts of such assemblies shall be constructed to afford the fire resistance required by Code for the location and condition of construction indicated. See required ratings and designs on Drawings. Construction shall conform to requirements of these tested assemblies.

C. Sound Transmission Classification (STC): Certain partition, wall and ceiling assemblies with gypsum board surfaces are required to provide minimum installed STC ratings as tested in accordance with ASTM E 90, using the large scale test opening. Assemblies required to have STC ratings shall be constructed to afford the indicated rating. Ratings are indicated in partition, wall and ceiling types on the Drawings.

D. Project Conditions:
   1. Coordinate gypsum board Work with Work specified in other Sections to properly locate framing members and to provide additional framing and backing as necessary for recessed and built-in components. Verify that framing and furring are securely attached and of sizes and spacing to provide a suitable substrate to receive gypsum board.
   2. Do not install interior products until installation areas are enclosed and conditioned. Maintain a uniform temperature of 55-70 degrees F during installation and finishing of gypsum board.
   3. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
      a. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
      b. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD

A. Specified Manufacturer: US Gypsum Company (USG), Chicago, IL (800/874-4968; local representative, Ontario, CA, 800/964-4874).

B. Acceptable Manufacturers: Equivalent products of other manufacturers, including National Gypsum Company, Charlotte, NC (704/365-7300 or 800/628-4662; West region office 800/824-4227) will be acceptable in accordance with the "or equal" provision specified in Section 01630 - Product Options and Substitutions.

C. Gypsum Board Materials, General: Gypsum board, joint treatment and finishing materials shall be manufactured from asbestos-free materials.

D. Typical Gypsum Board: ASTM C 36, Type X (special fire-resistant), typically 48-inches wide and 5/8-inch thick, square cut ends, tapered sides.
E. Abuse-Resistant Gypsum Board:

1. Abuse-Resistant Gypsum Board: USG Fiberock Brand VHI Panels, consisting of face layers of fiberglass scrim embedded in a high-density layer of gypsum and cellulose fibers, with perlite core, producing panels with high resistance to abrasion, indentation and penetration.

2. Fire-Resistance: Abuse-resistant gypsum board shall be comparable to Type X gypsum panels when tested according to ASTM E 119 and shall have the following fire performance characteristics when tested according to ASTM E 84:
   a. Flame spread: 5.
   b. Smoke developed: 0.


2. XP Wallboard, manufactured by National Gypsum Company.

2.2 ACCESSORIES

A. Accessories, General: Provide accessories as recommended in reference standards and manufacturer's product data. Provide accessories as required for a complete installation and in conformance to fire resistance ratings, where indicated.

B. Screws: ASTM C 1002, unless otherwise indicated. Use steel self-drilling screws complying with ASTM C 954 for fastening panels to steel members from 0.033- to 0.112-inch (0.84 to 2.84 mm) thick.

C. Laminating Adhesive: Adhesive for laminating multi-layer installations of type as recommended by gypsum board manufacturer and approved for fire rated construction. Comply with VOC requirements specified in Section 01352 - Sustainable Design Requirements. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).


E. Taping and Embedding Compounds:

1. Taping and Embedding Compound, Gypsum Board: Specifically formulated and manufactured for use in embedded tape at gypsum board joints and completely compatible with tape and substrate.

2. Taping and Embedding Compound, Abuse-Resistive Gypsum Board: Proprietary, factory-packaged material specifically formulated for spray application, chemical-hardening compound, USG Sheetrock Lightweight Setting-Type (Easy Sand), or equal.

3. Taping and Embedding Compound, Gypsum Soffit Board: Proprietary, factory-packaged material specifically formulated for spray application, chemical-hardening compound, USG Sheetrock Lightweight Setting-Type (Easy Sand), or equal.

F. Finishing or Topping Compound: Specifically formulated and manufactured for use as a finishing compound.

G. All Purpose Compound: Specifically formulated and manufactured to serve as both a taping and a finishing compound and compatible with tape and substrate.

H. Joint Tape, Gypsum Board: Perforated cross laminated, tapered edge, reinforced paper, or special tape recommended by the manufacturer.
I. Gypsum Board Primer/Sealer: USG Sheetrock First Coat, flat vinyl latex drywall primer, to equalize surface absorption and texture variations, non-asbestos, with maximum VOC emission of 2 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

J. Hat Section Furring Channels: 1-5/8 inch steel stud or 7/8-inch deep special furring shape, cold rolled light gage steel, minimum 25 gage, galvanized, with matching track as required.

K. Furring Channel Clip: USG Metal Furring Channel Clip,

L. Cornerbead: USG No. 800 or equal.

M. Edge Trim: USG No. 200-B or equal.

N. Casing Bead: USG No. 66, square edge, or equal

O. Control Joint: USG No. 093 or equal.

P. Water: Clean, fresh, potable.

Q. Drywall Acoustical Sealant: Coordinate with requirements specified in Section 07900 - Joint Sealers. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24). Comply with VOC requirements specified in Section 01352 - Sustainable Design Requirements.

1. For gypsum board to gypsum board and gypsum board to structure joints, exposed and concealed joints: Non-hardening sealant specifically for gypsum board joints, one of the following:
   a. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.

2. For non-electrical penetrations of gypsum board at non-fire rated construction: Inmont Corp., PressTite No. 579.64, or equal.

3. For other penetrations at fire-rated construction, provide firestopping as specified in Section 07840 - Firestopping and Smoke Seals.

4. For electrical power and signal penetrations of gypsum board at non-fire rated construction: Polybutene-butyl sheet calking for application to exterior back, top and sides of recessed panelboards and outlet boxes for electrical power, CATV, telephone, fire alarm and other signal systems. Provide one of the following:
   b. Sound Pad #68, manufactured by L.H. Dottie Co., City of Commerce, CA (323/725-1000).

5. For electrical power and signal penetrations of gypsum board at fire-rated construction: For application to exterior back, top and sides of recessed panelboards and outlet boxes for electrical power, CATV, telephone, fire alarm and other signal systems. Provide one of the following:
c. Hilti CP617 Putty Pads, manufactured by Hilti, Tulsa, OK (800/879-6000).

d. 3M Fire Barrier Moldable Putty Pads, Type MPP-X, manufactured by 3M, St. Paul, MN (800/328-1687).

e. Metacalk Putty Pads, manufactured by RectorSeal, Houston, TX (800/231-2245).

PART 3 - EXECUTION

3.1 GYPSUM BOARD INSTALLATION

A. Reference Standards: Install gypsum board in accordance with GA-201 and GA-216. Hold bottom edge of gypsum board up 1/4-inch to 1/2-inch above floor.

B. Industry Standard: Comply with USG Specification and Technical Bulletins No. SA-922, No. SA-923, and No. SA-924, or equivalent Gold Bond publications if Gold Bond products are used, as applicable for materials location, installation and condition of construction.

C. Regulatory Requirements: Install gypsum board products in accordance with applicable Code requirements and requirements of listed assemblies shown on Drawings.

D. Single Layer Installation: Provide fire-resistive (Type X) gypsum board typically, unless otherwise indicated. Install gypsum board vertically, with edges and ends occurring over firm bearing.

E. Fastener Locations and Spacing: Locate and space fasteners in accordance with reference standards and fire rating requirements of wall, partition, floor and ceiling assemblies. Coordinate locations and spacing with special details on Drawings, such as deflection provisions at heads of partitions.

F. Trim Installations: Use longest practical lengths. Place corner beads at external corners. Place edge trim when gypsum board abuts dissimilar materials.

G. Acoustical Sealant: Apply sealant as gypsum panels are installed, with full seal of penetrations and perimeters, as specified in reference standards and USG technical bulletins and sealant manufacturer's installation requirements and recommendations.

1. Seal perimeter of gypsum board surface at floor and ceiling.

2. Apply gypsum board joint treatment over sealed joints.

3. Apply 1/4-inch minimum rounded bead of sealant around all cut-outs, such as electrical boxes, HVAC ducts, fire extinguisher cabinets and other built-in components.

H. Penetration Seals: Install acoustical pads to electrical power and signal boxes and seal joint between junction box and gypsum board with acoustical sealant.

1. Comply with manufacturer's instructions and recommendations.

2. Clean surfaces to receive acoustical pads with suitable cleaner.

3. Center outlet box pad on back of junction box. Mold pad around conduit and cable entering box. Mold cover around box sides, covering all openings. Press pad material firmly into place.

4. At fire-rated conditions, comply with requirements for fire-rated penetrations specified in Section 07840 - Firestopping and Smoke Seals.
3.2 GYPSUM BOARD FINISHING AND DECORATING

A. Reference Standards: Comply with ASTM C 840, GA-216, GA-214, and as follows.

B. Concealed Locations: GA-214, Level 1. Provide this level of finish at locations such as plenum areas above ceilings, in attics, in areas where assembly would generally be concealed. Commonly, finish is called "fire-taping."
   1. Joints and interior angles: Tape embedded in joint compound.
   2. Surface: Free of excess joint compound. Tool marks and ridges will be acceptable.

C. Semi-Exposed Locations: GA-214, Level 2. Provide this level of finish at locations not exposed to public view, such as electrical rooms. Work rooms, storage rooms and maintenance spaces shall be considered exposed to public view.
   1. Joints and interior angles: Tape embedded in joint compound. One separate coat of joint compound shall be applied over all joints, angles, fastener heads and accessories.
   2. Surface: Free of excess joint compound. Tool marks and ridges will be acceptable.

D. Exposed Locations to Receive Paneling, Mirrors or Wallcoverings: GA-214, Level 3. Provide this level of finish at locations under acoustical panels and unframed mirrors.
   1. Joints and interior angles: Tape embedded in joint compound. Two separate coats of joint compound shall be applied over all joints, angles, fastener heads and accessories.
   2. Surface: Smooth and free of tool marks and ridges.
   3. Drywall primer/sealer: Apply where panels and wallcovering will be adhered to gypsum board.

E. Exposed Locations with Paint Finish on Smooth Surface: GA-214, Level 5. Provide this level of finish at locations with flat, eggshell and semi-gloss paint finishes on untextured surfaces. Stipple paint will not constitute textured surface.
   1. Joints and interior angles: Tape embedded in joint compound. Three separate coats of joint compound shall be applied over all joints, angles, fastener heads and accessories. A thin skim coat of joint or topping compound shall be applied over entire surface and sanded.
   2. Surface: Smooth and free of tool marks, voids, ridges and sags.
   3. Drywall primer/sealer: Apply primer prior to application of finish coatings, including primer paints.

END OF SECTION
SECTION 09510
ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Suspended exposed T-bar metal ceiling grid systems.
B. Mineral fiber acoustical lay-in panels.

1.2 RELATED SECTIONS

A. Division 15 - Mechanical: Plumbing, fire protection and HVAC system components that penetrate suspended acoustical ceilings.
B. Division 16 - Electrical: Electrical lighting and signal system components that penetrate suspended acoustical ceilings.

1.3 SUBMITTALS

A. Shop Drawings: Submit reflected ceiling plans.
   1. Indicate types of units, layout and pattern of units, details of suspension systems, details at changes of level, details of ceiling penetrations and other interruptions, edge treatments and all necessary connections with adjoining Work.
   2. Show all lighting fixtures, HVAC grilles and diffusers, access doors and similar products set into ceiling.

B. Samples:
   1. Ceiling grid.
   2. Acoustical panel units.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements, Seismic Design: Conform to California Building Code (CBC) requirements and requirements of the Division of the State Architect (DSA) for seismic-resistant design and installation of ceiling suspension system., including DSA Interpretation of Regulations, IR M-3

B. Regulatory Requirements, Fire Characteristics: California Building Code (CSC), for class as indicated below, as determined by an independent testing laboratory acceptable to authorities having jurisdiction.
   1. Exit ways: Maximum Flame Spread Class I.
      a. Flame Spread: ASTM E 84, 25 or less.
      b. Smoke Density: ASTM E 662, not more than 450.
2. Rooms and other areas: Maximum Flame Spread Class 11.
   a. Flame Spread: ASTM E 84, not more than 75.
   b. Smoke Density: ASTM E 662, not more than 450.

C. Sequencing and Scheduling: Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved. Schedule installation of acoustic units after interior wet work is dry.

1.5 EXTRA STOCK

A. Extra Stock: Provide quantity of each acoustical panel type equal to 5 percent of installed quantity but not less than 6 each. Refer to Section 01770 - Contract Closeout Procedures.

PART 2 - PRODUCTS

2.1 SUSPENSION SYSTEM

A. Specified Manufacturer: Armstrong World Industries, Inc. (717/397-0611 or 800/448-1405).

B. Acceptable Manufacturers: Equivalent products of the manufacturers listed below will be acceptable in accordance with the "or equal" provision specified in Section 01630 - Product Options and Substitutions. Equivalent products of other manufacturers will be considered in accordance with the substitution provision specified in Section 01630 - Product Options and Substitutions.

1. USG Interiors, Ceiling Suspension Division (Donn), Chicago, IL (800/950-3839); OX Series with DX26 main tees and DX416 cross tees.
2. Chicago Metallic Corporation, Chicago, IL (708/563-4600 or 8001323-7164); Snap Grid System, with 200 main tees and 204 cross tees.


1. Runners: 9/16-inch exposed bottom flange, 1-1/2 inch high web, metal thickness to suit duty classification of system.
2. Wall channel: Shadow molding, 15/16-inch vertical leg, 318-inch steps and 9/16-inch bottom flange, hemmed edges, 0.018-inch metal.

D. Finishes, Exposed Surfaces: Factory-finished paint

1. Acoustical panel Type A (typical): Standard low gloss white.

E. Braces and Supports: Galvanized steel, size and type to suit application, to rigidly support and secure acoustic ceiling system including support of integral mechanical and electrical components with maximum deflection of 1/360 and to seismically brace ceiling in accordance with applicable California Building Code (CBC) requirements, including DSA interpretation of Regulations, IR M-3. requirements.

1. Hanger Rods: Mild steel, zinc coated, or protected with rust-inhibitive paint.
2. Flat Hangers: Mild steel, zinc coated, or protected with rust-inhibitive paint.
3. Angle Hangers: Angles with legs not less than 7/16-inch wide, formed with 0.0365-inch-thick galvanized steel sheet complying with ASTM A 446, Coating Designation G90, with bolted connections and 5/16-inch-diameter bolts.

F. Hangers Wires: ASTM A 641, soft temper, pre-stretched, Class 1 coating, sized so that stress at 3-times hanger design load (ASTM C 635, Table 1, Direct Hung), will be less than yield stress of wire, but provide not less than 12 gage (0.1055-inch diameter).

2.2 WET-FORMED MINERAL FIBER ACOUSTICAL CEILING PANELS

A. Specified Manufacturer: Armstrong World Industries, Inc. (717/397-0611 or 800/448-1405).

B. Acceptable Manufacturers: Equivalent products of the manufacturers listed below will be acceptable. Equivalent products of other manufacturers will be acceptable in accordance with the "or equal" provision of the Contract.

1. Celotex Building Products, Tampa, FL (813/873-1700).
2. USG Interiors, Inc., Chicago, IL (800/950-3839).

C. Acoustical Ceiling Panels, General: Lay-in, mineral fiber panels for exposed-T suspension system, Fed Spec SS-S1188, Type III, Class A.

D. Wet-Formed Mineral Fiber Acoustical Ceiling Panels: For use with Suspension System Type B,

4. Face Pattern: Non-directional fissured texture with single score to simulate 24 x 24 inch panels.
5. Edges: Angled Tegular, for 9/16-inch exposed grid tee.
6. NRC: 0.55
7. CAG: 30, minimum.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verification:

1. Verify that existing conditions are ready to receive work.
2. Verify that layout of hangers will not interfere with other work.
3.2 SUSPENDED T-BAR CEILING SYSTEM INSTALLATION

A. Suspended T-Bar Ceiling System Installation, General: Install system according to manufacturer's instructions and recommendations, ASTM C 636 for duty classification, California Building Code (CBC), DSA IR M-3 and the following:

1. Install system capable of supporting imposed loads to a deflection of L1360 maximum.

2. Install system after major above-ceiling work is complete. Coordinate locations of hangers with related work.

3. Suspend system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

4. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

5. Locate system on room axis according to reflected ceiling plan. Unless otherwise indicated or directed, adjust layout so that cut panels are not less than 1/2 panel width.

6. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 11/2 inches of each corner or support components independently with hanger wires at each corner of component.

7. Do not eccentrically load system, or produce rotation of runners.

B. Seismic Bracing of Ceiling System: Comply with details indicated on the Drawings, requirements of California State Building Code (CSC), and approved details of the Division of the State Architect (DSA) Interpretation of Regulations IR M-3.

1. Provide set of 4 splay wires for each 144 sf of ceiling unless other specially designed and detailed bracing is provided. First set of splay wires shall be maximum 6 feet 0 inches from any wall. Wires shall be taut without causing ceiling to lift.

2. Fasten hanger wires with not less than 3 tight turns within 1-112 inches. Secure splay wires with 4 tight turns within 1-1/2 inches.

3. Separate all ceiling wires and unbraced ducts, pipes and fixtures by at least 6-inches.

4. Install compression members as detailed on the Drawings.

C. Ceiling Trim Installation: Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions.


1. Install acoustical panels with edges in close contact with metal supports and in true alignment.

2. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings.

3. Scribe and cut panels at borders and penetrations to provide a neat, precise fit. Field cut reveal-edge into cut panels.
4. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.

5. Paint cut edges of panel remaining exposed after installation. Match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.3 TOLERANCES. SUSPENDED ACOUSTICAL CEILING SYSTEM

A. Variation from Flat and Level Surface: 1/8-inch in 10 feet.

B. Variation from Plumb of Grid Members caused by eccentric loads: Two degrees maximum.

END OF SECTION
SECTION 09820

ACOUSTICAL INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Acoustical batt insulation for installation in interior wall and ceiling construction.

1.2 RELATED SECTIONS

A. Section 09110 - Non-Load Bearing Metal Framing: Spacing of framing and other provisions for installation of batt insulation.

B. Section 09250 - Gypsum Board: Acoustical sealants.

1.3 SUBMITTALS

A. Materials List: Submit materials list, stating manufacturer and product identification for each product to be provided.

1.4 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver materials to Project site in manufacturer's original packaging. Clearly identify manufacturer, contents, brand name and applicable standard.

B. Storage: Store materials off ground. Protect against weather, condensation, and damage. Immediately remove damaged material from site.

1.5 SCHEDULING

A. Coordination: Coordinate installation with placement and fitting with Work specified in other Sections.

1. Do not install insulation until construction has progressed to the point that inclement weather will not damage or wet the insulation material.

2. Install insulation after electric wiring, plumbing and other concealed work is in place.

3. Insulation shall not be closed in until it has been inspected and approved.

PART 2 - PRODUCTS

2.1 ACOUSTICAL BATT INSULATION, GLASS-FIBER

A. Specified Manufacturer: Owens Corning Fiberglas Corporation (OCF), Toledo, OH (800/438-7465).

B. Acceptable Manufacturers: Equivalent products of the manufacturers listed below will be acceptable in accordance with the "or equal" provision of the Contract Documents.

1. CertainTeed Corp., Valley Forge, PA.

C. Unfaced Glass Fiber Blanket/Batt Insulation: Insulation produced by combining glass fibers with thermosetting resins to comply with ASTM C 685, Type I (blankets without membrane facing) and ASTM C 136
   2. Blanket insulation on top of acoustical ceilings: OCF Sonobatts Insulation, suitable for exposed insulation on top of t-bar grid and lay-in acoustical ceiling panels.

D. Surface Burning Characteristics: Tested according to ASTM E 84.
   2. Smoke developed: 10

E. Insulation Thickness and Width:
   1. Walls: Nominal 3-1/2 inches thick by framing cavity width.
   2. Ceilings: Nominal 3-1/2 inches thick, unless otherwise indicated. Insulation width shall be optional with Contractor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation, General: Install batt insulation in accordance with manufacturer's instructions.
   1. Fit insulation around ducting, piping, wiring and other obstructions.
   2. Stagger end joints between studs and between planes of multi-layer insulation.
   3. Fill entire width of cavity between framing members with insulation.
   4. Trim insulation neatly to fit non-standard framing cavity widths.

B. Acoustical Batt Installation: See Drawings for locations to receive acoustical batt insulation.
   1. Fill stud wall cavities with acoustical insulation in accordance with partition construction schedules and details indicated on the Drawings.
   2. Cover top side of interior ceilings with acoustical insulation where indicated on the Drawings.

3.2 ACOUSTICAL BOARD INSULATION INSTALLATION

A. Acoustical Board Insulation: Install semi-rigid insulation where indicated on the Drawings, cutting and fitting as necessary to accommodate penetrating elements such as ceiling suspension wires and braces, HVAC outlets and grilles, luminaires, and sound and fire alarm systems.
   1. Butt edges tightly.
   2. Ceiling suspension wires may pass through insulation.
3. Allow for openings for light fixtures, speakers, fire sprinkler heads and ductwork, fitting insulation tightly around penetrating elements, except maintain required clearance at light fixtures to allow for heat dissipation.

4. Secure semi-rigid insulation in place using impale clips and adhesive, as appropriate to substrate and installation condition. Paint exposed clips matte black to match insulation finish. Do not paint insulation.

END OF SECTION
PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Surface preparation for painting.

B. Priming and finish painting.

1.2 RELATED SECTIONS

A. Section 05120 - Structural Steel: Shop priming.

B. Section 05505 - Miscellaneous Metal Fabrications: Shop primer painting. Exterior metal fabrications shall be finished as specified in Section 09970 - Coatings for Exterior Steel.

C. Section 07900 - Joint Sealers: Painter's caulk.

D. Section 09250 - Gypsum Board: Topping and finish requirements for gypsum board surfaces; gypsum board primer/sealer.

E. Division 15 - Mechanical: Field painting requirements for plumbing, fire protection and HVAC components, including color coding of installed components.

F. Division 16 - Electrical: Field painting requirements for electrical components.

1.3 WORK TO BE PAINTED

A. Work to be Painted, General: Unless specifically noted, paint all exposed surfaces unless noted otherwise, whether or not colors are indicated. Specific exceptions are noted below in Article titled, WORK NOT TO BE PAINTED. Where products or surfaces are not specifically indicated for a specified finish, paint these the same as adjacent similar products and surfaces.

B. Exterior Work to be Painted: Work to be painted includes:

1. Flashing and sheet metal, including copings, counterflashings and trim.

2. Rooftop elements, including roof hatches, pipes and vents, exposed conduit, ductwork and HVAC equipment exposed to view.

3. Plaster walls and soffits.

C. Interior Work to be Painted: Work to be painted includes:

1. Interior gypsum board walls, soffits and ceilings.

2. Interior concrete and masonry walls.

1.4 WORK NOT TO BE PAINTED

A. Work Not to be Painted: Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts, and labels.
B. Pre-Finished Items: Unless otherwise specified or noted, do not paint factory-finished components, including the following.

1. Acoustic materials: Suspended acoustical T-bar grid and acoustical panels.
2. Finished mechanical and electrical equipment.
3. Light fixtures, unless specifically noted.

C. Concealed Surfaces: Do not paint concealed surfaces, including wall or ceiling surfaces in the following generally inaccessible areas.

1. Furred areas.
2. Utility chases and pipe spaces.
3. Duct, piping and conduit shafts.

D. Finished Metal Surfaces: Do not paint natural metal, plated metal and factory-finished metal surfaces (except where specifically indicated), including the following:

1. Anodized aluminum.
2. Stainless steel.
3. Chromium plate.

E. Operating Parts: Do not paint operating parts, including moving parts of operating equipment such as the following.

1. Valve and damper operators.
2. Linkages.
4. Motor and fan shafts.

F. Labels: Do not paint over Underwriter's Laboratories, Inc. (UL), Factory Mutual Research Organization (FM) and other code-required labels and over equipment names, identifications, performance ratings, and nomenclature plates.

1.5 REFERENCES

A. Society for Protective Coatings (SSPC): SSPC - Surface Preparation Specifications.

B. ASTM 0 16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products.

1.6 SUBMITTALS

A. Product Data: Submit materials list for all paint products. For substitute products, submit full product technical data, including certification of conformance to air quality regulations, in accordance with requirements specified in Section 01630 - Product Options and Substitutions.
B. Color Samples:

1. Preliminary selection samples: Submit three sets of color samples for colors not indicated on Drawings. Colors shall be as directed by Architect, if not indicated on the Drawings.

2. Verification samples: After preliminary review and selection, and for colors specified or indicated on Drawings, submit four sets of brushout samples for review.

3. Field verification mock-up: Provide one 4-foot by 8-foot mock-up of each color specified.

C. Manufacturer's Instructions:

1. Submit manufacturer's instructions and project-specific recommendations for surface preparation.

2. Submit manufacturer's instructions and project-specific recommendations for application of primer, intermediate and finish coats.

D. Spray Painting:

1. Coordinate spray painting operations with surrounding Work. Protect items not being painted from overspray.

2. Comply with local trade practices and regulatory requirements.

3. Contractor shall solely be responsible for use of spray equipment.

1.7 QUALITY ASSURANCE

A. Reference: Refer to ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Lacquer, and Related Products for definitions of terms used in this Section.

B. Applicator Qualification: Company specializing in application of quality paints and coatings, with three years documented experience.

C. Regulatory Requirements: Conform to California Air Resources Board (CARB)' South Coast Air Quality Management District (SCAQMD) and other applicable local air quality regulations for products and application.

D. Application Conditions, General:

1. Comply with requirements specified herein except comply with manufacturer's requirements and recommendations if more stringent.

2. Substrate Condition: Dry and well-cured.

3. Wind and Drafts: Minimal only, no direct air movement across surface being painted.

4. Dust: Do not paint under dusty conditions. Remove dust from substrate before painting. Do not allow dust to adhere to wet surface.
E. Interior Application Conditions:

1. Ventilation and heating: Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45 degrees F for 24 hours before, during, and 48 hours after application of finishes, unless permitted by manufacturer's instructions and recommendations.

2. Interior lighting conditions: Provide full lighting level approximating final permanent lighting during application.

F. Exterior Application Conditions:

1. Do not apply exterior coatings during rain, fog or freezing conditions, or when relative humidity is above 50 percent, unless permitted by manufacturer's instructions and recommendations.

2. Exterior Substrate Temperature: Minimum 40 degrees F to maximum 80 degrees F.

G. Application Temperatures:

1. Water-based paints: Apply water-based paint at interior between 45 and 90 degrees F ambient temperature. Apply water-based paint at exterior between 50 and 90 degrees F ambient temperature.

2. Solvent-thinned paints: If used, apply solvent-thinned paint between 45 and 95 degrees F.

1.8 DELIVERY, STORAGE AND HANDLING

A. Delivery, Storage and Handling, General: Deliver, store and handle products in accordance with requirements of manufacturer's instructions and in conformance to applicable air quality and safety regulations.

B. Delivery: Deliver products to site and keep in sealed and labeled containers until ready for use. Label containers with manufacturer's name, type of paint, brand name, brand code, air quality regulation certification, coverage rate, surface preparation requirements, drying time, cleanup, color designation, and instructions for mixing and reducing.

C. Storage: Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in well-ventilated area and in accordance with applicable fire and air quality regulations. Comply with manufacturer's instructions and recommendations if more stringent. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.9 EXTRA MATERIALS

A. Extra Materials:

1. Wall paint: Furnish a one gallon container of each paint type and color.

2. Trim paint: Furnish a one quart container of each paint type and color.

3. Identification: Label each container with color, gloss and original application locations, in addition to the manufacturer's label.
PART 2 - PRODUCTS

2.1 PAINT MATERIALS

A. Specified Manufacturer: Dunn-Edwards Corporation, Los Angeles, CA (213/771-3330 or 800/372-6470).

B. Acceptable Manufacturers: Equivalent products of the manufacturers listed below will be acceptable in accordance with the "or equal" provision of the General Conditions. Equivalent products of other manufacturers will be considered in accordance with the substitution provision specified in Section 01630 - Product Options and Substitutions.

2. Frazee Paint & Wall covering, San Diego, CA (619/276-9500).
3. ICI Dulux Paints, Los Angeles, CA (213/888-8888 or 800/339-6910).

C. Paints, Stains and Special Coatings: See PAINT SCHEDULE at end of PART 3, below, for specific primers and finish paints, stains and special coatings. All primers, paints, stains and finishes shall comply with applicable State and regional VOC regulations. Should products not comply, provide substitute products in compliance with "or equal" provision specified in Section 01630 - Product Options and Substitutions. Provide ultra-low and zero VOC products for interior applications, as specified.

D. Primers and Undercoats: Primers and other undercoat paints shall be components of published system of paint manufacturer for intended use.

E. Gloss: As defined according to Master Painters Institute (MPI) Gloss Standards.

1. Flat (MPI G1 or G2) refers to a lusterless or matte finish with maximum gloss of 10 units when measured at 50-degree angle.
2. Eggshell (MPI G3) refers to traditional "eggshell-like" finish with gloss range between 10 and 25 units when measured at 60-degree angle.
3. Satin (MPI G4) refers to "satin like" finish with gloss range between 20 and 35 units when measured at 50-degree angle.
4. Semigloss (MPI G5) refers to traditional semigloss finish with gloss range between 35 and 70 units when measured at 60-degree angle.
5. Gloss (MPI G6) refers to traditional gloss finish with gloss range between 70 and 85 units when measured at 60-degree angle.
6. High Gloss (MPI G7) refers to high-gloss finish with gloss range more than 85 units when measured at 60-degree angle.

2.2 MISCELLANEOUS MATERIALS

A. Thinners, General: Use only thinners approved by paint manufacturer, and use only within recommended limits.
B. Acrylic-based Product Thinner: Clear, potable water, free from materials detrimental to paint performance.

C. Putty: Acrylic, fast-drying, low shrinkage.

D. Painter's Caulk: Joint filler, acrylic-based, as specified in Section 07900 - Joint Sealers.

2.3 COLORS

A. Paint Colors:

1. Provide factory mixed paint, colors modified in field only under direction of Architect.

2. Provide colors as indicated on the Drawings or, if not indicated, as selected and directed by Architect.

3. Paint colors shall not be limited to those of submitted or specified paint manufacturer.

4. Generally, colors will be evenly divided between like conditions, unless otherwise indicated.

B. Color Selections: Cooperate by supplying selection and presentation color chips for Architect to use in making selections. Paint colors shall not be limited to those of submitted or specified paint manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION, GENERAL

A. Examination: Examine substrate for conditions which may adversely affect finish application durability and appearance.

1. Do not proceed with surface preparation or paint application until defects are corrected. Proceeding will be interpreted to mean that substrate conditions were acceptable.

2. Surfaces which cannot be prepared or painted as specified shall be immediately reported in writing to College's Representative and Architect.

B. Preparation of Previously-Painted Surfaces: Prepare surfaces according to paint manufacturer's instructions and recommendations.

1. Sand surfaces and wipe-down to dust-free condition.

2. Remove all oily and greasy substances.

3. Repair surface defects. Spot prime where bare metal is exposed.

4. Remove surface corrosion. Apply one coat of primer to provide smooth surface without evidence of spot priming and surface defects repair.
C. Removals: Before start of preparation, remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface applied protection before surface preparation and painting.

1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

D. Masking and Covering: Exercise care not to deface adjoining Work. Use suitable clean cover cloths or other approved protection materials to cover adjoining Work. Mask small items and edges to prevent and control paint coverage.

3.2 CLEANING

A. Cleaning and Preparation, General: Clean and prepare surfaces to be painted according to paint manufacturer’s instructions and recommendations for each particular substrate condition and as specified.

1. Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings.

2. Remove oil and grease before cleaning.

3. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

B. Cleaning, Impervious Surfaces: Wash surfaces with mild detergent solution. Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

C. Cleaning, Aluminum Surfaces Scheduled for Paint Finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.

D. Cleaning, Galvanized Surfaces: Remove surface contamination and oils by wash with solvent.

3.3 SURFACE PREPARATION, GENERAL

A. Surface Preparation, General: Clean and prepare surfaces to be painted according to manufacturer’s written instructions for each particular substrate condition and as specified.

1. Clean all interior wall surfaces of loose, peeling, and scaly paint, dirt, dust, rust, chalk and other foreign matter as required to provide a clean sound surface for the new coatings and paints.

2. Clean all exterior walls and surfaces of loose, peeling, and scaly paint, dirt, dust, rust, chalk and other foreign matter by power washing as required to provide clean sound surface for coatings and paints.

3. Deteriorated or dry rotted wood shall be replaced prior to paint application. Comply with finish carpentry and woodwork specifications in Division 6 - Wood and Plastic.

4. Provide barrier coats over incompatible primers or remove and reprime.
B. Concrete Surface Preparation:

1. Prepare concrete, concrete unit masonry and cement plaster surfaces to be painted. Remove soiling, efflorescence, salts, alkali powder, chalk, dust, dirt, grease, oils, release agents and other foreign matter by brushing and power washing.

2. Remove oil and grease with solution of trisodium phosphate.

3. Remove rust stains with solution of sodium metasilicate after thoroughly wetting surface with water.

4. Flush surfaces to remove cleansing agents and allow to thoroughly dry.

5. Roughen as necessary to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation. Use abrasive blast-cleaning methods if recommended by paint manufacturer.

6. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.

C. Ferrous Metals Preparation:

1. Interior ferrous metals preparation, unpainted: Clean ungalvanized ferrous-metal surfaces that have not been previously painted or shop coated. Remove oil, grease, dirt, loose mill scale, corrosion and other foreign substances. Use solvent or mechanical cleaning methods that comply with paint manufacturer's recommendations.
   a. Clean steel surfaces as necessary with wire brush to achieve metal surface according to SSPC-SP 3.
   b. Treat bare metal with a metal treatment wash coat before priming.
   c. Clean surfaces with solvent to remove oil and grease.
   d. Clean surface of dust with tackrags prior to applying primer.

2. Interior galvanized metal preparation, unpainted: Clean ungalvanized ferrous-metal surfaces that have not been previously painted or shop coated. Use solvent or mechanical cleaning methods that comply with paint manufacturer's recommendations.
   a. Clean galvanized surfaces with non-petroleum-based solvents so surface is free of oil and surface contaminants.
   b. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
3. Interior ferrous and galvanized metal preparation, previously primed and painted surfaces: Comply with paint manufacturer’s instructions and recommendations.
   a. Remove all loose and deteriorated primer and finish paint. Sand and scrape to remove loose coatings and corrosion.
   b. Fully scuff sand, prime and finish as for unprimed ferrous metals.
   c. Touch up bare areas and shop-applied prime coats that have been damaged. Touch up with primer scheduled below for field application. Feather edges to make touch-up patches inconspicuous.
   d. Clean surfaces with solvent to remove oil and grease.
   e. Clean surface of dust with tackrags.

4. Exterior ferrous and galvanized steel, previously painted, including at canopies and soffits:
   a. Remove all loose and deteriorated primer and finish paint. Sand and scrape to remove loose coatings and corrosion.
   b. Blast-clean plain steel surfaces according to the requirements of SSPC Specification SSPC-SP 5/NACE No.1, "White Metal Blast Cleaning." Remove all corrosion (rust).
   c. Blast-clean galvanized steel surfaces according to the requirements of SSPC Specification SSPC-SP 6/NACE No.3, "Commercial Blast Cleaning." Use blast media that removes primer and paint but retains zinc coating (galvanizing). Where zinc coating is removed and white metal is revealed, treat white metal and other damaged galvanized areas with hot zinc galvanizing repair as specified in Section 05081, Galvanized Finishes on Steel.
   d. Clean surfaces with solvent to remove oil and grease.
   e. Fill all depressions and voids with epoxy-type automotive body filler and sand smooth.
   f. Clean surface of dust with tackrags.

3.4 SURFACE PREPARATION, SPECIFIC CONDITIONS

   A. Gypsum Board Surfaces Preparation: Latex fill minor defects. Spot prime defects after repair.

   B. Plaster Preparation: Fill hairline cracks, small holes and imperfections with latex patching plaster. Make surface level and blend texture to match surrounding finish. Wash and neutralize high alkali surfaces.

   C. Patching and Sanding, General: Correct minor surface defects. Major defects shall be repaired by replacement.

      1. Repair, patch and fill all surfaces as necessary to match existing surface texture and to present uniform surface appearance matching surrounding surfaces. Repair all cracks and voids greater than 1/32-inch as follows:
2. Voids, cracks and joints up to 1/16-inch wide: Repaired using a brushable grade sealant with 2-inch wide minimum seam. Seam patch shall be feathered to zero at the edges to prevent the repair from telegraphing through top coats.

3. Voids, cracks and joints exceeding 1/16-inch wide: Patched or filled using a knife grade sealant.
   a. All exterior openings should be sealed as specified in Section 07900 - Joint Sealers. Deteriorated sealant shall be removed and new backing material and sealant shall be installed prior to painting.
   b. Determine compatibility between paints and joint sealers. Notify College’s Representative and Architect of incompatibilities and other conditions which are detrimental to proper joint sealing and paint adhesion.

4. Cracks larger than 1/8-inch wide: Scrapped and widened in a V-groove pattern to promote good penetration and adhesion of the patching material. Fill groove (crack) with suitable patching material compatible with substrate material and matching surface finish.

5. Putty voids and nail heads.

D. Moisture Content: Measure moisture at surfaces using an electronic moisture meter. Do not apply finishes unless moisture is below the following maximums:
   1. Concrete: 15 percent.
   2. Interior Gypsum Wallboard: 12 percent.

3.5 PRIMING

A. Compatibility: Verify compatibility of primers with surfaces on which to be applied. If primer or finish coating is incompatible, follow manufacturer’s recommendations.

B. Steel: Prime all bare steel surfaces.

C. Preprimed Surfaces: Touch up with matching primer. Reprime steel items which have been exposed to weather more than 7 days.

3.6 FINISH PAINT APPLICATION, GENERAL

A. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
   1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
   2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
   3. Use only thinners approved by paint manufacturer and only within recommended limits.
B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer’s written instructions, sand between applications.

2. At metal surfaces that have been shop primed and touch-up painted, omit primer if primer is suitable for finish coats.

3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

C. Paint Application, General:

1. Apply primers, intermediate coats and finish coats of paint as scheduled below and in compliance with paint manufacturer's instructions and recommendations.

2. Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness (DFT) indicated in paint manufacturer's published specifications and application instructions.

3. Provide total dry film thickness (DFT) of the entire system as recommended by manufacturer.

4. Brush Application: Brush out and work brush coats into surfaces in an even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Neatly draw glass lines and color breaks.

5. Spray Application: Use spray equipment for application only when permitted by manufacturer's recommendations and applicable ordinances and regulations of authorities having jurisdiction.

D. Prime Coat Application:

1. Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been shop primed or shop painted.

2. Reccoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

E. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
1. Carry finish coats to natural breaks and transitions.

2. Apply each coat to uniform film thickness, not less than and not exceeding amount to achieve recommended dry film thickness of paint manufacturer. Adjust applied thickness to suit substrate and ambient temperatures to minimize brush and roller marks.

3. Allow each coat to cure before recoating, adjusting manufacturer's minimum time between coats to accommodate Project conditions.

F. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.

G. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.

H. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint Work not complying with requirements.

I. Holidays and Thin Spots: Recoat and blend in. If blending is unsuccessful, sand and recoat entire surface.

J. Dust, Runs, Drips, Sags, Color Separation: Remove surface defects, sand and recoat entire surface.

K. Metal Surfaces: If brush application cannot produce a smooth surface without laps or brush marks, use spray application under dust free conditions.

L. Final Finish: Even, smooth color and finish with no apparent brush or roller marks.

3.7 FINISH PAINT APPLICATION, SPECIFIC CONDITIONS

A. Mechanical and Electrical Components: Refer to requirements specified in Division 15 - Mechanical and Division 16 - Electrical for color-coding and identification banding of equipment, ductwork, piping and conduit.
   1. Paint shop-primed equipment. Do not paint utility-provided transformers and switchgear.
   2. Paint exposed exterior fire water service main piping, valves and appurtenances.
   3. Field paint rooftop HVAC and airhandler units, where exposed to view.
   4. Remove unfinished louvers, grilles, covers and access panels on mechanical and electrical components and paint separately.
   5. Prime and paint insulated and exposed pipes, conduits, boxes, insulated and exposed ducts, hangers, metal louvers, brackets, collars and supports, except where components are prefinished.
   6. Paint fire sprinkler system components where exposed in finish construction. Do not paint sprinkler heads.
   7. Replace identification markings on mechanical and electrical equipment when painted unintentionally.
8. Paint surfaces of air ducts that are visible through grilles and louvers, using one coat of flat black paint, to limit of sight lines. Paint dampers exposed behinde louvers and grilles to match face panels.

9. Paint exposed conduit and electrical equipment occurring in finished areas.

10. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.

11. Color code equipment, piping, conduit and exposed ductwork in accordance with requirements indicated. Color band and identity flow with arrows, names and numbering, using stencils, pre-printed labels or other approved systems.

12. Replace electrical plates, hardware, light fixture trim and fittings removed prior to finishing.

B. Rooftop HVAC and Airhandler Units and Ductwork: If exposed to view, field paint color as directed.

C. Lighting Fixture (Luminaire) Trim: Paint to match surrounding surfaces, unless otherwise directed. At acoustical panels finished in factory white color, do not paint lighting fixture trim.

3.8 CLEANING, TOUCH-UP AND PROTECTION

A. Cleaning: As Work proceeds, promptly remove paint where spilled, splashed, or spattered. Remove all paint spots, oils or stains from adjacent surfaces, leaving the Work and Work area clean and ready for Substantial Completion review.

B. Debris and Waste: During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove daily from site. Remove empty paint containers from site.

C. Touch-Up: At completion of Work specified in other Sections, touch-up painted and finished surfaces and restore to original condition finishes damaged or defaced.

D. Protection: Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings used to protect adjacent surfaces and products.

3.9 PAINT SCHEDULE

A. Paint Schedule: Provide paint systems (PS) as follows and as recommended by paint manufacturer.

1. Provide primers as recommended by paint manufacturer and in compliance with applicable air quality regulations. Spot prime and sand existing painted surfaces as recommended by paint manufacturer for repainting and finish repair.

2. The number of coats listed is the minimum number of coats required. Provide number of coats as necessary for full and complete coverage.

3. Provide two finish coats at previously unpainted products and over primer. Provide one finish coat at previously painted products. Provide additional finish coats as necessary to achieve full and complete coverage.
4. The first {primer} coat of multi-coat system may be omitted on products shop or factory primed and on existing surfaces to be repainted, except refinishing of existing aluminum framing and doors. Spot prime and sand existing painted surfaces as recommended by paint manufacturer for repainting and as specified above.

5. Unless otherwise noted, products listed are by Dunn-Edwards Corporation.

**PS-1**

EXTERIOR CONCRETE - FLAT FINISH (Acrylic-Water Base Finish)

Coat 1: W 709          EFF-STOP
Coat 2: W 705          ENDUROCRYL, Exterior 100% Acrylic Low Sheen
Coat 3: W 705          Finish ENDUROCRYL, Exterior 100% Acrylic Low Sheen Finish

**PS-5**

INTERIOR GYPSUM BOARD - SEMI-GLOSS FINISH (Zero VOC Finish)

Coat 1: W 600          ECOSHIELD PRIMER, Low-Odor/Zero VOC Interior Latex Primer
Coat 2: W 603          ECOSHIELD Low Odor, 0 VOC Latex Semi-Gloss Paint
Coat 3: W 603          ECOSHIELD Low Odor, 0 VOC Latex Semi-Gloss Paint**

**Note:** After application, create stipple finish with roller.

**PS-6**

INTERIOR GYPSUM BOARD - LOW SHEEN FINISH (Zero VOC)

Coat 1: W 600          ECOSHIELD PRIMER, Low-Odor/Zero VOC Interior Latex Primer
Coat 2: W 602          ECOSHIELD Low Odor, 0 VOC Latex Low Sheen Paint
Coat 3: W 602          ECOSHIELD Low Odor, 0 VOC Latex Low Sheen Paint

END OF SECTION
SECTION 15010

BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes:

1. This section provides the basic mechanical requirements that apply to the Work of Division 15.

C. Related Sections:

1. Division 16: Electrical.

D. Coordination:

1. Coordinate related Work of Division 15: Mechanical.

2. Coordinate related Work of other divisions.

3. Coordinate scheduling to minimize operational disruption of existing facilities.

D. Ordinances and Regulatory Requirements:

1. Current federal Safe Drinking Water Act (SDWA) regulations require the furnishing of lead-free pipe, solder, and flux in the installation or repair of plumbing in non-residential facilities connected to public drinking water systems. Under this regulation, solders and flux are considered lead-free when they contain 0.2 percent lead or less. Pipes and pipe fittings are considered lead-free when they contain 8.0 percent lead or less.

   a. Provide lead-free water pipe, solder, and flux materials that meet the standards as outlined by the federal SDWA regulations.

   b. Collect pipe, solder, and flux material samples as required by the IOR. Test samples shall be delivered to an Owner designated testing laboratory for testing of lead content.

      (1) Test samples for lead content by the atomic absorption spectrophotometry method.

   c. Materials found not conforming to SDWA regulations shall be deemed defective Work and shall be replaced with lead-free materials.
d. Comprehensive testing of the remaining materials for their lead content shall be performed as required by the IOR.

2. Workmanship, materials, equipment, and installation shall comply with industry standards and code requirements. Where manufacturer’s recommendations exceed industry standards, the manufacturer’s recommendation shall establish the minimum standard. As a minimum, standards from the following organizations shall apply:

a. AGA - American Gas Association.

b. AMCA - Air Moving and Conditioning Association.

c. ANSI - American National Standards Institute.

d. ARI - Air Conditioning Refrigeration Institute.

e. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers.


g. AWA - American Waterworks Association.

h. FM - Factory Mutual.


j. OSHA - Occupational Safety and Health Administration.

k. SMACNA - Sheet Metal and Air Conditioning Contractors National Association, Inc.

l. UL - Underwriters Laboratories.

3. Workmanship, materials, equipment, and installation shall comply with federal, state, and local codes including, but not limited to, the following:

a. CBC, CMC, and CPC - latest edition as adopted by the City of Los Angeles, the County of Los Angeles, and the State of California including amendments effective on the Effective Date of the Contract.

b. Title 8, California Administrative Code.


d. Division of Industrial Safety - boiler and fire-pressured vessel safety orders.

e. Division of Industrial Safety - electrical safety orders.
f. OSHA - Occupational Safety and Health Administration.

g. Department of Health.

h. South Coast Air Quality Management District.

4. Specifications or Drawings shall be not construed to permit deviation from the requirements of governing codes unless approval has been obtained from legally constituted authorities having jurisdiction, and the Architect. The Contract Documents may contain more stringent requirements than those legally required.

E. Permits and Fees: Refer to the General and Supplementary Conditions.

F. Drawings and Specifications:

1. Contract Documents indicate extent and general arrangement of Work under Division 15. Architect may require adjustments to provide maximum headroom, a neat arrangement to keep passageways and openings clear to provide accessibility and provisions for maintenance, and to meet code requirements.

2. Refer to Section 01100 to coordinate mechanical Work with Work of other Divisions.

G. Materials and Equipment:

1. Unless otherwise specified, materials and equipment shall be new, in good and clean condition. Equipment, materials, and components shall be of the make, type and model number noted on Drawings or specified. Pieces of equipment of the same type shall be by the same manufacturer.

2. Whenever an item is listed by a single proprietary name, with or without model number and type, it shall be for purpose of design only, to indicate characteristics and quality desired. Proprietary designation listed on Drawings, or listed first in Specifications, is used as a basis for design to establish a standard for quality and performance and space requirements.

3. For substitution of materials or products, refer to the General Conditions.

H. Submittals:

1. Provide submittals in accordance with Section 01300 and with specific requirements of Division 15, as applicable.

2. Submit materials for potable water systems as required by the IOR.

3. Submit the following:

   a. A complete materials list of items to be furnished and installed under this Division.
b. Shop Drawings, as required.

c. Manufacturer's specifications and other Product Data required to demonstrate compliance with specified requirements.

d. Manufacturer's printed installation instructions

e. Catalogs.

f. Operating instructions.

4. When reviewed by the Architect, the above information shall become the basis for inspecting and testing materials and actual installation procedures performed in the Work.

5. Shop Drawings: Submit one additional copy when control diagrams having line voltage connections are indicated. Shop Drawings shall be specifically prepared for the Work of this Project, as required. Drawings prepared in AutoCAD Release 2010 format may be provided by the Architect to serve as a background for the Shop Drawings. Shop Drawings shall indicate at a minimum:

a. Complete system layout of equipment, components, ductwork, and piping, indicating service clearances.

b. Schedule and description of equipment, ductwork, piping, fittings, valves, dampers, and controllers.

I. Protection, Care and Cleaning: In addition to storage criteria of the General Conditions, and provisions under Section 01500: Construction Facilities and Temporary Controls, the following shall be provided:

1. Provide for the safety and good condition of materials and equipment until Substantial Completion. Protect materials and equipment from damage.

2. Protect installed Work.

3. Replacements: In case of damage, immediately provide repairs and/or replacements as required.

4. Delivery and Storage: Deliver materials to Project site in their original unopened containers with labels intact and legible at time of delivery. Store in strict accordance with manufacturer's recommendations.

5. Do not store plastic pipe or materials in direct sunlight.

6. Protect covering for bearings, open connections to tanks, pipe coils, pumps, compressors and similar equipment.

7. Interior of ductwork shall be maintained free of dirt, grit, dust, loose insulation, and other foreign materials.
8. Air handling equipment shall not be operated until building is cleaned and air filters are installed.

9. Fixtures, piping, finished brass or bronze, and equipment shall have grease, adhesive, labels, and foreign materials removed. Chromium, nickel plate, polished bronze or brass Work shall be polished. Glass shall be cleaned inside and out.

10. Before initial start-up and again before Substantial Completion, piping shall be drained and flushed to completely remove grease and foreign matter. Pressure regulating assemblies, traps, strainers, boilers, flush valves, and similar items shall be thoroughly cleaned. Tag system with an information tag listing responsible party and date of element, before initial start-up and again before Substantial Completion. Compressed air, oil, and gas piping shall be blown out with oil-free compressed air or inert gas. Refrigerant piping shall be cleaned as specified.

J. Guarantees and Damage Responsibility:

1. Sound of water flowing in piping shall not be transmitted to building structure. Operation of mechanical system shall not produce operational sounds that can be heard outside of rooms enclosing apparatus or equipment.

2. Unit heaters, unit ventilators, unit air conditioners and fans, and distribution systems shall be warranted by their manufacturers to operate without undue noise of more than 50 decibels on the A scale, measured 10 feet away from the unit unless otherwise specified. Perform adjustments or required corrective actions to meet these standards without reducing flow quantities specified in the Contract Documents.

K. Project Record Documents:

1. Comply with provisions of Section 01700: Contract Closeout.

2. Project Record Drawings: Provide a complete set mechanical, plumbing, fire protection and control system drawings in AutoCAD Release 2010 or higher format, complete with external reference drawings, fonts, blocks and plotter pen color/line thickness settings on CD-ROM. Also submit one set of full size reproducible plots on vellum and 3 sets of prints.

3. Before Final Completion, deliver corrected and completed prints to the OAR. Delivery of project record documents to the OAR does not relinquish responsibility of furnishing required information omitted from project record documents.

L. Preliminary Operation:

1. OAR may require any portion of mechanical Work to be operated before Substantial Completion. Such operation shall be in addition to regular tests, demonstrations and instructions required under the Contract Documents, and shall be performed as required.

2. Notify the IOR at least 24 hours in advance of lighting or re-lighting pilots.
M. Tests and Testing:

1. Tests shall be as required under the applicable sections of Division 15, including this section.

2. Tests required by other sections of the Contract Documents include the following:
   a. Test and balance of mechanical equipment and systems.
      (Section 01450: Test and Balance)
   b. Test of smoke and/or fire detectors.
      (Division 16: Electrical)

3. Additional tests may be required in the case of products, materials, and equipment if:
   a. Submitted items are altered, changed, or cannot be determined as exactly conforming to the Contract Documents.
   b. Performance testing and results may also be required on certain items which are as specified, including fan, and pump performance.

4. Piping Tests:
   a. Perform tests required to demonstrate that operation of mechanical systems and their parts are in accordance with Specifications covering each item or system, and furnish materials, instruments and equipment necessary to conduct such tests. Tests shall be performed in presence of the IOR, and representatives of any governmental agency having jurisdiction. Work shall not be concealed or covered until required results are provided.
   b. If required tests are not performed, Owner may provide in accordance with the Contract Documents.
   c. Pressure gauges furnished in testing shall provide one-pound graduations; vacuum gauges shall provide one-inch mercury graduations. Air shall be bled from lines requiring hydrostatic or water tests.
   d. Systems shall be pressure-tested in accordance with pipe testing schedule below. Pipe test shall indicate no loss in pressure after a minimum duration of 4 hours at test pressures indicated. Where local codes require higher test pressures than specified herein for fire sprinkler systems, local codes shall govern.
   e. Fuel gas lines shall be first tested with piping exposed, before backfilling trenches or lathing; second with piping in finished arrangement, backfilled and paved where required, and walls finished.
   f. Refrigerant piping may be tested with a halide detector or calibrated electronic testing equipment.
g. Piping systems may be tested as a unit or in sections, but entire system shall successfully meet requirements specified herein, before final testing by the IOR.

h. Repair of damage to pipes and their appurtenances or to any other structures resulting from or caused by these tests, shall be provided.

5. Pipe Testing Schedule:

<table>
<thead>
<tr>
<th>System Tested</th>
<th>Test Pressure (psig)</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>With:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Durham system, glass or plastic acid waste, vent and roof drain (except pipes running under a slab or underground)</td>
<td>Fill with water to top of highest vent, allow to stand two hours, or longer, as required by Inspector. Minimum head required for any joint shall be 10-feet in building.</td>
<td>Water</td>
</tr>
<tr>
<td>b. Cast-iron soil, waste and interior downspout, condensate drain from air conditioning equipment</td>
<td>10' of water, vertically</td>
<td></td>
</tr>
<tr>
<td>c. Domestic water piping (metallic)</td>
<td>200</td>
<td>Water</td>
</tr>
<tr>
<td>d. Standpipes, wet or dry</td>
<td>300</td>
<td>Water</td>
</tr>
<tr>
<td>e. Fire sprinkler piping</td>
<td>200</td>
<td>Water</td>
</tr>
<tr>
<td>f. Gas piping (steel threaded or plastic)</td>
<td>60 (both tests)</td>
<td>Air</td>
</tr>
<tr>
<td>g. Gas piping (steel welded)</td>
<td>100 (both tests)</td>
<td>Air</td>
</tr>
<tr>
<td>h. Gas welding station</td>
<td>1-1/2 Working pressure Dry nitrogen 100 minimum</td>
<td></td>
</tr>
<tr>
<td>i. Compressed air piping</td>
<td>175</td>
<td>Air</td>
</tr>
</tbody>
</table>
j. Refrigeration suction

k. R-134a 150 Dry nitrogen

l. Freon F-22 230

m. Refrigeration liquid and hot gas piping
   R-134a 250 Dry nitrogen

n. Freon 410A 300 Dry nitrogen

6. Equipment Performance Assurance Tests:

a. Before operating any equipment or systems, a thorough check shall be performed to determine that systems have been flushed and cleaned as required and that equipment has been properly installed, aligned, lubricated, and serviced. Factory instructions shall be checked to verify installations have been completed, recommended lubricants have been installed in bearings, gearboxes, crankcases, and similar equipment. Particular care shall be furnished in lubricating bearings to avoid damage by over-lubrication and blowing out seals. Equipment shall also be checked for damage that may have occurred during shipment, after delivery, or during installation. Damaged equipment, products, and/or materials shall be replaced or repaired as required.

b. Equipment Start-up Reports: For each equipment or system on which start-up is performed, submit 8 copies of the start-up report for review by the Architect.

   1. The start-up report shall include the manufacturer’s standard start-up form completed and signed by the start-up technician.

   2. Provide, maintain, and pay costs for equipment, instruments, and operating personnel as required for specified tests.

d. Provide electric energy and fuel required for tests.

e. Final adjustment to equipment or systems shall meet specified performance requirements.

f. Equipment, systems, or Work deemed defective during testing shall be replaced and/or corrected as required. Test until satisfactory results are provided.

7. Specific Coordinated Plan for Test & Balance at Substantial Completion:

a. Provide a narrative of the operational intent that clearly describes the function and sequence of operation of each component, equipment, or system installed. Instruct designated Owner personnel in the operation of the installed systems.
b. Before Substantial Completion, mechanical equipment and systems shall be operated and tested for a period of at least 5 consecutive days to demonstrate satisfactory overall operation of the installed systems. Tests shall include operation of heating, ventilating, and air conditioning equipment and systems for a period of not less than two 8 hour periods at 90 percent of the full specified heating and cooling capacities.

c. Tests shall commence after preliminary balancing, adjustments to equipment and systems have been completed, and operating equipment has been checked and thoroughly lubricated.

d. Immediately before starting tests, air filter media shall be cleaned or renewed. Roll-type filters shall be advanced to provide new clean media. Cleanable type media shall be thoroughly cleaned and re-oiled with new, clean oil as recommended by manufacturer if they are of viscous impingement type. Disposable type filters shall be replaced with new filters. Replaceable media shall be replaced with new media.

e. An accurate means of measuring air flow and temperatures shall be furnished to balance air supply, return, and exhaust systems so uniform temperatures occur in every room and design airflow is obtained through registers, diffusers, and grilles.

f. Systems shall be adjusted to provide airflows indicated including maximum fresh air and maximum return air. Dampers shall be checked for proper settings and operation. Air and water inlet and leaving temperatures at coils shall be checked. Complete operational data including airflows, room temperatures, fan speeds, motor currents, plenum, and duct static pressures shall be tabulated.

g. Welding performed as part of this Division may be subject to radiographic inspections at random in accordance with requirements specified in Section 15050: Basic Mechanical Materials and Methods.

N. Location:

1. Location of piping, apparatus, and equipment as indicated on Drawings is approximate and shall be altered to avoid obstructions, preserve headroom and provide free and clear openings and passageways.

2. Trenches parallel to footings shall not be closer than 18 inches to the face of footings and shall not be below a plane having a downward slope of 2 horizontal to one vertical, from a line 9 inches above bottom of footing.

3. Pipe in tunnels shall be installed close to one side of tunnel to provide maximum space for passage. Pipe shall not be installed through crawl hole unless otherwise specified or detailed on Drawings.

4. Place equipment in locations and spaces indicated, disassemble and/or reassemble equipment as required by Project conditions.
O. Cutting, Notching and Backing:

1. Conform to California Building Code, Title 24, Part 2, Section 2320.A11.10, for notches and bored holes in wood; Section 1906A.3, for pipes and sleeves embedded in concrete and for cuts in steel, as detailed on structural Drawings.

2. Where pipes or ducts pass through, or are located within one inch of any construction element, install a resilient pad, 1/2 inch thick minimum, to prevent contact.

3. Furnish all necessary provisions for recesses, chases, accesses, and provide wood blocking and backing as necessary for proper reception and installation of mechanical Work.

P. Service Interruptions, Off-site, Gas and Water:

1. Schedule Work so there shall be no service interruptions of existing systems and/or systems during normal hours of operation of affected systems and/or facilities.

2. When service interruptions are mandatory, arrange in advance with the OAR as to time and date of such interruptions.

3. Systems, which are interrupted, shall be returned back into operation in such manner that they will function as originally intended.

Q. Operation and Maintenance Manuals:

1. General: Submit 2 copies of operation and maintenance manuals in required form and content. If no revisions are required, furnish one additional copy. If revisions are required, one copy shall be returned with instructions for changes; perform such changes and return 3 copies of manuals. Manuals shall be bound in hardback, 3-ring, loose-leaf binders. Deliver manuals to the OAR. Submit an electronic copy of the entire manual in Adobe Acrobat (PDF file) format.

2. Contents of Manual:
   a. Title sheet with Project name, including names, addresses and telephone number of Contractor, installer, and related equipment suppliers.

   b. Manufacturer's operating instructions including, but not limited to, the following:

      (1) Identification of components and controls.

      (2) Pre-start checklist and start-up procedures.

      (3) Normal operation settings and checklists.

      (4) Pre-shut down checklist and shut down procedures.
(5) Trouble shooting checklist and guidelines.

(6) Recommendations for optimum performance.

(7) Warnings and safety precautions on improper or hazardous operational procedures or conditions

c. Manufacturer's product data and parts and maintenance booklet for each item of equipment furnished under Division 15 that includes the following as a minimum:

(1) Manufacturer’s model, identification and serial numbers.

(2) Exploded view of assembly drawings identifying each component or part with the relevant part number.

(3) Directory of manufacturer's representatives, service contractors and part distributors.

(4) Maintenance and trouble-shooting instructions, including schedule for preventive maintenance, periodic inspection and cleaning criteria.

d. Project Record Drawings: Complete set of mechanical, plumbing, fire protection and control system drawings in 50 percent reduced print format shall be furnished with the manual. Submit the above record drawings on CD-ROM in AutoCAD 2010 or higher format complete with external reference drawings, fonts, blocks, and plotter pen color/line thickness settings.

e. Test and balance reports: Submit as specified in Section 01450.

f. South Coast Air Quality Management District (SCAQMD) permits to install and operate boilers, water heaters and other fuel burning equipment and third-party source test reports as required by SCAQMD to allow start-up and operation of equipment.

g. Los Angeles County industrial waste permits.

h. Valve directory complete with location, function, size, and model of each valve with reference to the project record drawings.

i. Equipment and component identification chart complete with location, function, size, and model of each equipment or component with reference to the project record drawings.

R. Training of Owner Personnel:

1. Contract shall include the cost of training Owner operation and maintenance personnel in operating, adjusting, maintenance, trouble-shooting, and Project site
repair of each component, equipment, or system provided under this Contract as indicated in each section of Division 15.

2. Operational and maintenance training shall be conducted on the Project site.

3. Upon completion of Owner training, a completion certificate indicating the nature of the training and a description of the systems, complete with equipment and component lists shall be issued to each trainee. The certificate should be issued in duplicate with one copy retained by the OAR.

END OF SECTION
SECTION 15050

BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes:

1. This Section prescribes basic materials and methods generally common to the Work of Division 15.

C. Related Sections:

1. Section 02318: Excavating, Backfilling and Compacting for Utilities.

2. Section 15010: Basic Mechanical Requirements.

3. Division 15: Mechanical.

4. Division 16: Electrical.

1.2 SUBMITTALS

A. Provide in accordance with Division 01, Section 15010 and specific requirements of each section of Division 15.

1.3 QUALITY ASSURANCE

A. Standards: Comply with applicable national, state, and local codes and standards: ASTM, ASME, ANSI. Federal Specifications, AWWA, SISPI, NFPA, FM, UL, CPC California Plumbing Code, CMC, AGA.

B. 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 a history of successful production as reviewed by the Architect.

1.4 COORDINATION

A. Coordinate related Work in accordance with provisions of Section 01100: Coordination.
PART 2 - PRODUCTS

2.1 GENERAL

A. Provide the following products if they are indicated in the Contract Documents or if they are required for the proper installation, function or operation of equipment, systems or components indicated in the Contract Document.

B. Provide the following products as a complete assembly with required accessories for a complete and functioning entity in compliance with governing codes and applicable standards as specified in Section 15010, manufacturer's instructions or as required.

1. Omission of minor details in the Contract Documents does not waive and/or otherwise relinquish compliance with the above requirements.

2.2 MANUFACTURERS AND MATERIALS

A. Ball Valves: Provide as required for service shut-off and isolation of equipment and devices or buildings and sections of buildings in addition to where indicated on Drawings.

1. Bronze, 2 inches and smaller:

   BV-1       Class 150# SWP, 600 psi WOG, 2-piece construction, reinforced Teflon seats, adjustable packing gland, threaded ends:

   Type of Service: Plumbing hot and cold water, air compressor, chilled water, condenser water and pump discharge (Provide at air compressor discharge line, discharge side of air receiver, compressed air outlets in shop buildings. Also, refer to GV-1 and GV-3.)

   Hammond 8301; Stockham S-216-BR-R-T; American Fig. 2; Milwaukee BA 100; Nibco T-585-70

   BV-2       Same as BV-1 except with extended soldered ends.

   Also, refer to GV-2 and GV-4.

   Hammond 8311; Stockham S-216-BR-R-S; American 2S; Milwaukee BA 150; Nibco S-585-70

B. Earthquake Valve: (Provide at each gas meter.)

1. Schedule Numbers:

   EQV-1 Mechanically triggered by seismic movement, complying with state of California seismic response specifications, UL listed and state certified. Size and pressure as required and/or indicated on Drawings. (Minimum 1/4 psi, maximum 10 psi). Earthquake valve shall shut off gas automatically during an earthquake to prevent an explosion and/or fire. Valve shall be Koso earthquake valve, or equal, providing the following features:
a. Not sensitive to vibrations caused by passing trucks or accidental bumping.

b. Sensitive to wide amplitude G's only. Preset at factory for the correct G-rating.

c. Positive sealing from -10 degrees F. to 150 degrees F.

d. Visual open-close indicator.

e. Manual reset.

f. Plumb line for mounting.

g. Tripping mechanism has non-creeping rolling latch.

Install valve per manufacturer's recommendations only.

C. Gate Valves: (Provide as required for service shut-off and isolation of equipment and devices or buildings and sections of buildings in addition to where indicated on Drawings.)

GV-2 Same as GV-1, except solder ends:

Type of Service: Plumbing hot and cold water service. (Provide in yard box, to each group of fixtures behind access panels, where valves are located near ceiling and beams, etc.)

Hammond I8647; Crane 1701S; Milwaukee 115; Walworth 4SJ; American 3FS; Stockham B-104; Nibco S-113.

D. Heater Vent Pipe:

1. Schedule Number:

HVP-1 Shall be UL approved for service specified. Concealed heater vent pipe, including pipe in or through attic spaces, shall be Los Angeles City approved double wall metal vent pipe. For recessed wall heaters, furnish B.W. type. All others may be Type B, or B.W. Clearances must comply with Los Angeles City code and conditions of UL listing.

American Metal Dura-Vent
Products Co., Inc., Corp.,
Ameri-Vent Duravent

Hart and Cooley Mfg. Co. Metalbestos
NOTE: Component parts of a vent assembly, including vent cap, shall be companion items of same manufacturer. Each item shall be UL-approved and listed.

E. Piping:

1. Piping shall be continuously and permanently marked with manufacturer’s name, type of material, size, pressure rating, and the applicable ASTM, ANSI, UL, or NSF listing. On plastic pipe, date of extrusion must also be marked.

2. Underground non-ferrous pressure pipes shall be installed with proper color tracer wires. Refer to color code provisions in Section 15075: Mechanical Identification.

3. Refer to Heating and Air Conditioning Piping Systems: Section 15180 for heating water piping and fittings.

4. Schedule Number: Description

P-1 Cast iron soil – Hubless, service weight, with stainless steel banded, hubless, coupling (PF-1). F S WW-P-401, conforming to CISPI 310-85 and LAPMO 1S 6-75. Manufactured by American Foundry, Tyler, or AB & I.

P-2 Steel, galvanized, Schedule 40, ASTM A120. Manufactured by US Steel, Laclede, or equal.

P-3 Copper drainage tube, underground, type L hard, ASTM B 88, by Mueller Brass, Cerrobrass, or equal.

P-4 Copper drainage tube, inside structure and above grade. Type DWV hard, ASTM B306, by Mueller Brass, Anaconda, Cerrobrass or Cambridge-Lee Halstead.

P-6 Copper water tube, Type L hard, ANSI H23.1, ASTM B88, IAPMO IS. Mueller Brass, Cambridge-Lee Halstead, or equal.

P-7 Copper water tube, Type K hard, ANSI H23.1, ASTM B88, IAPMO 1S, by Mueller Brass, Cerrobrass or Cambridge-Lee Halstead.

P-8 Polyethylene plastic pipe, ASTM D1248 and D2513, standard dimension ratio. 11, rated at 80 psi working pressure at 73 degrees F. for 3 inches and smaller, SDR 11.5 rated at 76 psi at 73 degrees F. for 4 inches and above, butt or socket type fittings, joined by heat fusion, color orange or yellow, Plexco PE 2406, Phillips, or equal. Transition to anodeless steel riser at meter, regulator, or building wall. (Furnished for natural gas below grade only.)

P-9 Brass, seamless, 85-5-5-5 red brass, iron pipe size, threaded pipe, ASTM B43 by Mueller Brass, Cerrobrass or Cambridge-Lee Halstead.
P-10  Steel, black, Schedule 40, ASTM A53A, Type E, ERW by US Steel, Laclede, or equal.

P-11  Seamless copper tubing, tempered drawn, Type M, ASTM B88.

P-12  Cast Iron, 1-1/2 inches and 2 inches, threaded for Science Room Vents when ferrous waste piping is provided, ANSI-A21.10, WWP-356-36, ASTM D1784-699, by Duriron, or equal.

F. Pipe Fittings:

1. Schedule Number: Description

PF-1  Cast iron, soil or waste, no-hub coupling with neoprene gaskets, stainless steel corrugated shields and stainless steel clamps. F S WW-P-401, ASTM C564 and C1312 310. P-1 American Foundry, Tyler, or equal.

PF-2  Malleable iron, Class 150, screwed, galvanized, beaded, ANSI B 16.3. P-2 by Stockham, Stanley Flagg or Grinnell.


PF-6  Wrought copper - solder type ANSI B 16.22 Provide with P-6 by Mueller Brass, Nibco or Lee Brass and P-11.

Note: Pipe, solder, and flux shall be lead-free for drinking water. Flux shall be an-approved water-soluble material.

PF-7  Polyethylene plastic fittings, ASTM D 3261 and D 2683, standard dimension ratio 11, rated at 80 psi working pressure at 73 degrees F. for 3 inches and smaller, SDR 11.5 rated at 76 psi at 73 degrees F. for 4 inches and above, but or socket type fittings, joined by heat fusion, color orange or yellow, Plexco, Phillips, or equal. (Provide with P-8)


PF-9  Malleable iron, Class 125, ANSI B 16.3, threaded or welded Schedule 40 black steel for 2 inches and below and welded for 2-1/2 inches and above. (Provide with P-10, by Stockham, Grinnell, or equal).

PF-10 Cast iron, screwed, Class 125, ANSI B 16.1 Provide with P-12. By Stockham, Grinnell, or equal.

PF-11 Cast-iron OD sized, bell and spigot gasket joints.
PF-12  Steel butt weld type, ASTM A 234WPB. Provide with P-10.

G.  Pipe Isolators:

PLA-1  Absorption pad shall be not less than 1/2 inch thick, unloaded. Pad shall completely encompass pipe.

Stoneman,  Potter-Roemer,
Trisolator  PR-Isolator

PLA-2  Plastic cushion to form an insulating liner and eliminate metal to metal contact when securing copper tubes and pipes in air conditioning and refrigeration insulation preventing galvanic erosion.

Hydra-Zorb Cushion Clamps, or equal.

H.  Pressure Gauge:  Aluminum or steel case, minimum 4-1/4 inches dia; pressure type or combination vacuum-pressure type, with provisions for field calibration. Dial indicator to indicate pressure in psi with accuracy to within plus or minus 0.5 percent of maximum dial reading. Furnish gages with restriction screw, size 60, to eliminate vibration impulses. Black case and ring, bourdon tube of seamless copper alloy with brass tip and socket. Three way gauge cock, constructed of brass with stuffing box, 1/2 inch couplings, with fixed or movable cap nut to shut off pressure gauge.

PG-1  Pressure type, black drawn steel case, 4-1/2 inches glass dial, range approximately twice line pressure.

Marsh  Keckley  Trerice  Weksler  Weiss

I.  Plug Valves:

PV-1  2 inches and smaller: Rockwell No.114, lubricated plug type, 200 lb., water operating gauge pressure iron body and plug, regular pattern, threaded, with indicating arc; by Walworth, Homestead, WKM, or equal.

PV-1.  2-1/2 inches and larger: Rockwell No.115 and No.165 lubricated plug type, 200 lb. water operating gauge. Iron body and plug, regular pattern, flanged, with indicating arc. Walworth, Homestead, WKM, or equal.

J.  Safety, Relief Valves:

SRV-1  Combination temperature and pressure relief type. AGA approved. Set to open at 125 psi pressure.

Watts  Cash-Acme
40L  NCLX-1
SRV-2
Same as SRV-1, except provide on storage type water heater with anode in dip tube.

Watts
Cash Acme
10 x L
NCLX-1

SRV-3
Spring pop type, ASME and/or NB stamped and certified with manual lifting device for low-pressure steam boilers not exceeding 15 psig, and for hot water boilers and heaters operated at pressure not exceeding 160 psi or temperature not exceeding 250 degrees F. Outlet shall be one pipe size larger than inlet.

Crane Bailey Cash-Acme Keckley

SRV-4
Spring type, ASME and NB stamped and certified with manual lifting device for air or gas.

Bailey Cash-Acme Watts Keckley

K. Strainers:

STR-1
Description: Wye type with monel or stainless steel strainer cylinder (manufacturer's standard mesh), and gasketed machine strainer cap. Where indicated on Drawings, provide with valved (globe valve) blowout piping, same size as blowout plug.

2 inches and smaller: C.M. Bailey No.100-A, 250 lb., cast iron body, threaded, Keckley 'B'.

2-1/2 inches and larger: C.M. Bailey No.100-A, 125 lb., cast iron body, flanged.

C.M.Bailey Armstrong Muessco Keckley 'A'

STR-2
Y pattern cast iron bodies, 125 psi, monel screen. Open area at least twice the cross-sectional area of IPS pipe in which strainer is installed and may be woven wire or perforated type. Screwed ends for sizes up to 2 inches, flanged ends for 2 1/2 inches and larger perforations, in accordance with the following:

Steam service - 40 sq. mesh.
Other services - 16 sq. mesh.

Bailey No.100 Armstrong RP&C Keckley
L. Thermometers (Remote):

T-3 Liquid-filled capillary type with bulbs as required for remote and insertion mounting dials of 3-1/2 inches minimum diameter, non-ferrous internal parts, external means for re-calibration, glass or plastic lens and steel or non-ferrous case suitable for wall, duct or panel mounting range 30 degrees - 240 degrees F. (Provide for measuring duct, plenum, and other air temperatures.)

Marsh  Trerice  U.S. Gauge  Weiss

M. Vent Caps:

VC-1 Vandal-proof hood type, for plumbing vent lines.

Stoneman Engr. and Mfg.
Semco 1550

N. Vacuum Valves:

VV-1 Vacuum valves; for vacuum serve, 125 psig working pressure, cast iron body, spring loaded lubricated plug type.

General Controls  Honeywell

O. Protective Coating for Underground Steel Piping Applied to Underground Automotive:

VV-1 Vacuum valves; for vacuum service, 125 psig (working hoist piping only)

1. Black steel or galvanized steel piping indicated for below grade installation, shall be protected as specified prior to delivery to the Project site:
   a. Sandblast black steel pipe to a gray finish. Sandblast galvanized steel pipe lightly only.
   b. Install one coat of cut back asphalt to galvanized pipe immediately after sandblasting. Pre-heat black pipe to 180 degrees F. immediately before coating.
   c. Install one coat of high-temperature (melting point of 240 degrees F. minimum) Grade B asphalt enamel.
   d. Install one wrapping of 20 mils thick glass, fiber mat, Owens-Corning Coromat or L.O.F. Blueflag with 1/4 inch overwrap. Glass fiber shall be dry at time of installation.
   e. Install a second coat of asphalt enamel as specified above. Glass fiber mat shall be centered in the asphalt enamel.
f. Install an overwrap of Kraft ripple paper.

2. Total thickness of pipe wrapping shall be not less than 1/8 inch. Entire coating operation shall be accomplished by mechanical means in a continuous operation. Hand installation of protective coating is not permitted.

3. Each piece of wrapped pipe shall be legibly identified at no greater than 5 feet intervals by fabrication company. Each material submittal shall include the name of the fabrication company. Maintain one reviewed Sample on the Project Site.

Acceptable wrapping companies:

Hunt Mobile Conway

4. Fittings (including couplings), unprotected pipe adjacent to fittings, and damaged pipe protection shall be wrapped at Project site as follows:

a. Fittings and pipe to be wrapped shall be thoroughly cleaned of material foreign to pipe manufacturer.

b. Install one coat of Plicoflex No. 105 or Protecto Wrap No. 1170 adhesive primer to metal.

c. Wrap pipe and fittings with a minimum thickness of 3/32 inch of Plicoflex No. 310 pipe line butyl molding tape, or Protecto Wrap No. 200 molding tape. Install 3 layers, each layer overlapping next approximately 2/3 width of tape, without stretching. Tape and primer shall be of the same manufacturer.

d. Wrap vinyl tape, 10 mil thickness, over molding tape with 1 inch minimum overlap.

    J.M. Trantex 3M Scotchwrap

5. Pipe and fittings specified to be wrapped shall be tested with a holiday detector, after pipe has been installed in trench and before backfilling, in presence of the IOR. Furnish a Tinkler and Raser model E-P holiday detector, or similar equipment for this test. Work, which is deemed defective, shall be repaired and/or replaced. IOR may test for damaged pipe wrapping after backfilling.

6. Instead of wrapping underground steel pipe as specified above, pipe may be machine-wrapped before delivery to the Project site as follows:
a. Pipe shall be cleaned of moisture, oil, grease, scale, and other foreign material by cleaning with non-oily solvent and wire brushing. Remove metal burrs and projections.

b. Install one coat of Plicoflex No.105 adhesive primer to cleaned pipe. If thinning is required, furnish only non-oily thinners as recommended by tape manufacturer.

c. Wrap coated pipe with Plicoflex No.340-25 tape (15 mil butyl and 10 mil vinyl laminate) Tape shall be installed by machine wrapping at approved plant only. Maintain tension (minimum of 5 pounds per inch of width) on tape over entire diameter of pipe. Tape shall be permanently identified and visible on vinyl side.

d. Fittings, unprotected pipe, and damaged pipe protection shall be wrapped as indicated above.

P. Pipe and Fitting Requirements Schedule:

1. Unless otherwise specified or indicated on Drawings, pipe and fittings shall be installed in accordance with the following table:

<table>
<thead>
<tr>
<th>Use</th>
<th>Limits</th>
<th>Pipe</th>
<th>Fittings</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic hot and Cold water, underground pipe</td>
<td>Up To 5 inches</td>
<td>P-6</td>
<td>PF-6</td>
<td>&quot;L&quot; Copper (No soft tubing)</td>
</tr>
<tr>
<td>Copper, underground soil only</td>
<td></td>
<td>P-7</td>
<td>PF-6</td>
<td>Furnish in hot</td>
</tr>
<tr>
<td>Cold water, underground</td>
<td>6 inches and over</td>
<td>P-14</td>
<td>PF-11</td>
<td>PVC</td>
</tr>
<tr>
<td>Domestic hot and Cold water, in building above ground</td>
<td>ALL</td>
<td>P-6</td>
<td>PF-6</td>
<td>&quot;L&quot; Copper Pipe (No soft tubing)</td>
</tr>
<tr>
<td>Drains From HVAC Equip.</td>
<td></td>
<td>P-11</td>
<td>PF-6</td>
<td>Copper</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Use</th>
<th>Limits</th>
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<th>Fittings</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downspouts, interior above and below grade, up to 5 feet from bldg.</td>
<td></td>
<td>P-1</td>
<td>PF-1</td>
<td>Cast-Iron</td>
</tr>
<tr>
<td>Fire Mains</td>
<td>Underground</td>
<td>P-14</td>
<td>PF-11</td>
<td>PVC</td>
</tr>
</tbody>
</table>
(Fire Hydrant)

| Gas Natural | Underground | P-8    | PF-7   | Polyethylene |
|            | Above ground | P-10   | PF-9   | Black Steel  |
| Copper Drainage Tube (Underground) | Waste and Vent | P-3    | PF-3   | Copper (DWV) |
| Copper Drainage Tube (Above Ground) | Waste and Vent | P-4    | PF-3   | Copper (DWV) |
| Vents | New Building | P-1    | PF-1   | Cast Iron Hubless |
| Vents | Existing Buildings, and Exposed Downspouts | P-2    | PF-2   | Galvanized Steel |
| Waste lines, Sanitary | | P-1 | PF-1 | Cast Iron |

2. For hot water heating piping and fittings, refer to Section 15180: Heating and Air Conditioning Piping Systems.

II. Flanges:

1. Flanges shall be furnished and installed at each flanged connection of equipment, tanks, and valves. Faces of flanges being connected shall be furnished alike. Connection of a raised face flange to a flat-faced flange is not permitted. Flanges shall conform to following schedules:

   **TYPE OF PIPE** | **FLANGE**
   ---------------|-------------------
   Screwed black or galvanized steel pipelines. | 125 pound black cast iron screwed flange, flat faced.
   Welded steel pipe, except high pressure steam lines. | 150 pound black forged steel welding flanges, 1/16 inch raised face ASTM A 105, Grade II.
   Copper and brass pipe or tubing. | 150 pound cast bronze, flat-faced flange with solder ends.

2. Gasket material for flanged connections shall be full faced or ring type to suit facing on flanges and shall be furnished in accordance with following schedule:

   **SERVICE** | **TYPE**
   -----------|-----------------
   Cold water | 1/16 inch thick neoprene
   Hot water | 1/16 inch Teflon

Q. Unions:

1. Unions shall be furnished and installed in accordance with the following requirements *(unless flanges are furnished)*:

   a. At each threaded or soldered connection to equipment and tanks, except in freon or fuel gas, piping systems, whether indicated or not.
b. At downstream, threaded connection to each manually operated threaded valve and cock, and each threaded check valve, except those in freon piping systems, and except those in yard boxes or access boxes, whether indicated or not.

c. At each threaded connection to threaded automatic valves (except those in freon piping systems) such as reducing valves and temperature control valves, whether indicated or not.

2. Unions shall be located so that piping can be easily disconnected for removal of equipment, tank, or valve.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which Work of this section shall be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Provide all materials and equipment for the Work. Furnish and install necessary apparatus, parts, materials, and accessories.

B. Pipe Installation:

1. Install piping parallel to wall and provide an orderly grouping of proper workmanship.

2. Piping shall clear obstructions, preserve headroom, provide openings and passageways clear, whether indicated or not. Verify the Work of other Divisions to avoid interference.

3. If obstructions or the Work of other Divisions prevent installation of piping or equipment as indicated by the Drawings, perform minor deviations as required by the Architect.

4. Install piping after excavation or cutting has been performed. Piping shall not be permanently enclosed, furred in, or covered before required inspection and testing is performed.

5. Exposed polished or enameled connections from fixtures or equipment shall be installed with no resulting tool marks or threads at fittings. Residue or exposed pipe compound shall be removed from exterior of pipe.

6. Piping shall be concealed in chases, partitions, walls, and between floors, unless otherwise directed or specifically noted on Drawings. When penetrating wood studs, joists, and other wood members, provide such members with reinforcement steel straps of Kees Protecta-Plate, or equal.
7. Reduce fitting where any change in pipe size occurs. Bushings shall not be furnished unless specifically reviewed by the Architect, or indicated on Drawings.

8. Piping subject to expansion or contraction shall be anchored in a manner, which permits strains to be evenly distributed. Swing joints or expansion loops shall be installed. Seismic restraints shall be installed so as not to interfere with expansion and contraction of piping.

9. Immediately after lines have been installed, openings shall be capped or plugged to prevent entrance of foreign materials. Caps shall be left in place until removal is necessary for completion of installation.

10. Couplings shall not be installed except where required pipe runs between other fittings are longer than standard length of type of pipe being installed and except where their installation is specifically reviewed by the Architect.

11. Changes in pipe sizes shall be furnished with eccentric reducers, flat on top. Offsets to clear obstruction shall not be installed so as to produce air pockets.

C. Pipe Sleeves and Plates:

1. Provide and install pipe sleeves of Schedule 40 black steel pipe or Schedule 40 PVC plastic pipe in concrete or masonry walls, footings, and concrete floors below grade. Provide and install adjustable submerged deck type sleeves at locations where pipes pass through concrete floors, except concrete slab floors on grade, and at locations where soil pipe for floor type water closets passes through concrete floors. Provide and install sleeve of 26 gauge galvanized sheet metal in other walls, partitions, and floors.

2. Sleeves shall provide 1/2 inch clearance around pipes (except plastic pipe shall have 1-inch clearance). Caps of deck type sleeves shall be removed just prior to installation of pipe. Area around sleeves shall be smooth and without high or low spots. Sleeves in walls shall not extend beyond exposed surface of wall. Sleeves in concrete floors and walls shall be securely fastened to forms to prevent movement while concrete is being placed.

3. Piping installed on a roof shall clear the roof surface by 10 inches minimum, with or without insulation. Bottom of individual fittings may infringe on 10 inches clear space but not groups of fittings or fittings located within 27 inches of each other.

4. Stiles shall be provided to facilitate crossing of piping when parallel piping runs are laterally greater than 12 inches out-to-out, or any pipe is higher than 18 inches, and more than 40 feet long or runs between 2 or more major pieces of equipment or housings greater than 20 feet apart. Stiles shall be not less than 20 inches wide with a minimum tread depth of 10 inches. Where stiles are required, they shall be located so greatest obstructed distance is 30 feet.

5. Where pipes pass through waterproofed walls, floors, or floors on grade, caulk with lead and oakum between pipe and sleeve to provide a waterproof joint. Where earth is in contact with pipe on both sides of a wall or foundation, the waterproof
6. A swing joint, or other required device, shall be furnished and installed in hot water lines with 10 feet of caulked or compression joint to allow for expansion.

7. Provide and install polished, chromium-plated cast brass set screw flanges when plumbing pipes pass through walls at plumbing fixtures, etc., as specified in Section 15400: Plumbing. Provide and install polished steel, chromium-plated split floor and ceiling plates at locations where pipes pass through walls, floors, ceilings, and partitions in finished portion, which neatly conceals pipe insert.

8. Pipe sleeves shall be provided where pipes intersect footings or foundation walls and sleeve clearances shall provide for footing settlement, but not less than one inch all around pipe.

D. Welding of Pipe and Qualifications of Welder:

1. Joints above grade or accessible conduit or tunnels in steel piping may be either welded or screwed unless specifically indicated otherwise on Drawings or specified. Joints in below grade steel piping, whether in insulation or not, shall not be welded, unless otherwise indicated.

2. Welded joints in pipe shall be continuous around pipe and shall comply with AISA B 31.1, unless otherwise specified.

3. Each pipe weld shall be stamped with welder's identification mark. Welding shall be performed by welders possessing a valid certificate of qualification for welding carbon steel welding pipe in horizontal position (2G) and horizontal fixed position (5G) in accordance with the requirements of Section IX of the ASTM code, by a Owner recognized, DSA approved testing laboratory.

4. Before any welder performs welding on the Work, furnish the IOR with a copy of welder's valid qualification papers and obtain verification. Welder qualification is not valid unless it has been issued while welder was performing work for current employer, and has performed type of work described by qualification in the preceding 3 months. (Reference: ASME Sec. VIII, U.W. 29, d).

5. Welding performed under these Specifications shall be subject to special tests and inspections including rigid Ultra Sonic Testing (UT) and radiographic inspection at random, in accordance with Technique for Radiographic Examination of Welded Joints (ASME Code for Unfired Pressure Vessels, Sec. VIII, U.W. 51), by an Owner recognized, DSA approved testing laboratory.

E. Unacceptable Welds and Repairs to Welding:

1. Welds containing any of the following types of imperfections shall be deemed defective Work:

   a. Cracks of any type.
b. Zones of incomplete (in excess of 1/32 inch) fusion or penetration.

c. Elongated slab inclusions longer than 1/4 inch.

d. Groups of slag inclusions in welds having an aggregate length greater than thickness of parent metal in a length 12 times the thickness of the parent metal.

e. Undercuts greater than 1/32 inch.

f. Overlaps, abrupt ridges or valleys.

2. When a defective weld is detected by examination as outlined above, 2 additional welds shall be radiographed at locations selected by the IOR. If the 2 selected welds demonstrate compliant welding, then the 2 tested welds shall be deemed to be in compliance. Welding revealed by radiographs to be defective Work shall be removed, repaired, and tested by radiograph.

3. If either of the 2 selected welds demonstrates welding deemed to be defective Work, all welding in that portion of the Work shall be deemed defective Work and either: all welds shall be cutout, prepare new ends for welding and weld to comply with this Specification, or radiograph all welds, removing and repairing only such welding deemed to be defective Work.

4. Repair welding shall be performed in a manner in full compliance with ASA B 31.0-1955. The welded joints or repairs shall be spot examined with UT or radiographic tests in accordance with foregoing requirements. (Reference, ASMA Boiler and Pressure Vessel Code Section VIII, U.W. 52.)

5. The Owner shall cause to be performed additional random UT and radiographic examinations of welds. Owner shall be responsible for the costs of any UT and radiographic examinations found to be in compliance with specified requirements.

6. Installer shall be responsible for the costs of UT and radiographic re-examinations of welds deemed defective Work and not in compliance with this Specification, and shall repair or replace said welds in accordance with specified requirements.

F. Welding Rods: Submit a written list of materials and proposed type of welding rods for review by the Architect.

G. Backing Rings: Backing rings may be submitted for installation provided the Product Data is submitted with the material list.

H. Qualification Tests for Low-pressure Welding:

1. Tests shall be performed on 3 inches standard weight pipe ASTM A53, Grade A, and shall be welded by acetylene and electric arc. Each sample shall consist of 2 pieces, each 10 inches long, with 30-degree bevel at point weld.

2. Two 20-inch samples shall be performed in the 2G and two 20-inch samples in the 5G positions, with positions defined in Section IX, ASME code. Welds shall have
the reinforcement ground or machined flush to the surface of the pipe before testing. Samples shall be tested as full section tensile.

3. Weld shall develop a load of 90 percent of 50,000 psi, i.e., 45,000 psi or shall develop a fracture in parent metal.

4. Each qualified welder shall carry an identification card listing welder’s name, date of test, and type of welding tests passed; signed by the welder and the laboratory.

5. A valid certificate of qualification issued in compliance with requirements of Section IX of the ASME code shall qualify a welder for issuance of a certificate for low-pressure pipe welding.

I. Certificates of Qualification for Welding of Unfired Pressure Vessels:

1. Certificates of qualification shall be issued by a laboratory recognized by the Owner in compliance with the requirements of Section IX of the ASME code, Unfired Pressure Vessels. Qualifications shall be for both acetylene and arc welding of ASA Schedule 40 ASA AS3, Type B or ASA Type B or ASA A120 Type B carbon steel welded pipe in the Horizontal Position (2G) and the Horizontal Fixed Position (5G) as defined by said code.

NOTE: Certificate described above is not valid unless it has been issued while welder was working for his current employer, and unless welder has performed type of work described by certificate in the preceding 3 months. Requirements for possession of a valid certificate shall not be waived for welders fabricating unfired pressure vessels when the Specifications require compliance with ASME code or when welding pipe carries working pressures greater than 75 psi and temperatures greater than 250 degrees F.

J. Pipe Joints and Connections:

1. Pipe and tubing shall be cut per IAPMO 1.S. Pipe shall have rough edges or burrs removed so that a smooth and unobstructed flow shall be provided.

2. Hot tapping of gas lines is strictly prohibited.

3. Threaded Pipe: Joints in piping shall be installed according to the following service schedule:
   a. Refrigerant and Soap Piping
   b. Plastic Piping
   c. Oxygen Piping
   d. Cleanout Plugs

Litharge and glycerine, or Expando, or equal.
Teflon pipe joint compound tape.
Wash treads with S.P., rinse, blow-dry and apply litharge and glycerine.
No compound shall be used. After inspection and test, plugs shall be
removed, cleaned, greased, and replaced.

e. All other services
Furnish sealant, suitable and as reviewed by the Architect.

4. Threads on pipe shall be cut with sharp, clean, unblemished dies and shall conform to ASA B 2.1 for tapered pipe threads.

5. Joint compounds shall be smoothly placed on male thread and not in fittings. Threaded joints shall be installed tight with tongs or wrenches and caulking of any kind is not permitted. Failed joints shall be replaced with new materials. Installation of thread cement or caulking to repair a leaking joint is not permitted.

6. Sharp-toothed Stilson, or similar wrenches, is not permitted for the installation of brass pipe or other piping with similar finished surfaces.

K. Copper Tubing and Brass Pipe with Threadless Fittings:

1. Silver brazed joints shall be installed for non-ferrous metallic refrigerant piping, non-ferrous metallic condensate piping and for attaching fittings to non-ferrous metallic piping for any service.

2. Silver brazing alloy shall conform to ASTM B260, Class BCUP-5. Surfaces to be joined shall be free of oil, grease, and oxides. Socket of fitting and end of pipe shall be thoroughly cleaned with emery cloth and wiped to remove oxides. After cleaning and before assembly or heating, flux shall be installed to each joint surface and spread evenly. Heat shall be applied in accordance with instructions in the Copper Tube Handbook issued by Copper Development Associates. Joints constructed of rough bronze fittings shall be provided as recommended by manufacturer.

3. Do not overheat piping and fittings when installing silver brazing.

4. Joints in non-ferrous piping for services not covered above, shall be installed with solder composed of 95-5 tin-antimony, ASTM B32, Grade 5A. Surfaces to be jointed shall be free of oil, grease, and oxides. Sockets of fitting and end of pipe shall be thoroughly cleaned with emery cloth to remove oxides. Solder flux shall be sparingly installed and solder added until joint is completely filled. Do not overheat. Excess solder, while plastic, shall be removed with a small brush in order to provide an uninterrupted fillet completely around joint. Random inspection of joints shall be conducted by IOR to ensure joints are lead-free.

L. Ring-Type Pipe: Joints shall be installed in accordance with manufacturer’s instructions with grooved couplings, fittings and rubber rings. Couplings and pipe shall be compatible and of the same manufacturer. Rings shall be accurately located and installed by grooves in coupling. Pipe shall be installed with zero deflection unless otherwise specified. Pressure pipe shall be furnished with thrust blocks at each offset point.

M. Welded Pipe Joints:
1. Joints in welded steel pipelines shall be installed by oxyacetylene or electric arc process. Welding shall be continuous around pipe and provided as specified.

2. Butt welds shall be of the single V-type, with ends of pipe and fittings beveled approximately 37-1/2 degrees. Piping shall be aligned before welding is started with the alignment maintained during welding.

3. Welds for flanges and socket fittings shall be of the fillet type with a throat dimension not less than pipe wall thickness.

N. Polyethylene (Plastic) Pipe:

1. Joints shall be installed by the heat fusion method, in accordance with manufacturer's recommendations and IAPMO installation standard IS 12, for natural gas.

2. Pipe Riser at Meter, Regulator and Building Wall: Prefabricated, anodeless type, utilizing a grade level transition between underground polyethylene pipe and gas supply steel pipe of riser outlet, R. W. Lyall Co., or equal. Below grade to above grade transition shall be installed in a welded, epoxy coated, steel casing.

3. Connections to Existing Pipe Line or Branch:
   a. Steel-to-plastic (PE): Provide manufacturer's prefabricated standard transition fitting, transition from epoxy-coated steel pipe to plastic, R. W. Lyall Co., or equal.
   b. Plastic-to-plastic, PVC to PE: Provide manufacturer's prefabricated standard transition fitting, transition from PVC to epoxy-coated steel pipe to PE; R.W. Lyall Co., or equal.
   c. Plastic-to-plastic, PE to PE: Provide manufacturer's standard fused tapping tee assembly with shut-off feature.

4. Provide PE reinforcing sleeves where PE pipe is fused to multi-saddles, service punch tee, reducing tees, transition fittings and anodeless risers.

O. Valves:

1. Valves shall conform to the requirements of this section:
   a. Piping systems shall be furnished with valves at points indicated on Drawings and specified, arranged to provide complete regulating control of piping system throughout building and the Project site.
   b. Valves shall be installed in a neat grouping, so that parts are easily accessible and maintained.
   c. Globe valves of disc type shall be furnished with composition disc suitable for service on which installed.
d. Valves shall be full size of line in which they are installed, unless otherwise indicated on Drawings or otherwise specified, and shall be one of types specified.

e. Provide chain operators on valves 2 inches and larger located 7 inches or more above the servicing floor level.

f. Valves for similar service shall be of one manufacturer.

g. Except where otherwise specified, valves shall be Stockham, Crane, Jenkins, Milwaukee, Hammond or American.

2. Furnished hose bibs in dense garden areas shall be 3/4 inch in size with 1 hose bib in the lunch pavilion 1 inch in size. Other furnished hose bibs, unless otherwise noted or specified, shall be 3/4 inch lock shield type. Bibs shall be furnished with vacuum breaker protection.

3. Safety valves and pressure relief valves shall have stamp of approval as required by ASME and shall be provided with annual test lever. Where a hot water storage tank is heated by means of a coil, pressure relief valve shall have a steam BTU discharge rating of the coil. Discharge pipe from safety or pressure relief valves shall be not less than one pipe size larger than inlet pipe size of valve. Discharge pipe shall terminate as indicated and shall be free of traps. In addition to locations specified, pressure relief valves shall be installed in the following locations:

a. On discharge side of each pressure-reducing valve.

b. On each water heater connected to a hot water storage tank and other pressure vessels.

c. On cold water line to each water heater or hot water storage tank when there is a check valve, backflow prevention valve or similar device between water heater or hot water storage tank and meter or relief valve at the pressure reducing valve assembly.

4. Temperature relief valves and combination temperature and pressure relief valves shall be as specified and furnished as set forth in this section. Discharge pipe from relief valves shall be not less than discharge area of valve or valves it connects, based on discharge area of valves, and shall terminate as indicated and free of any traps. Valves shall be installed at following locations:

a. A combination temperature and pressure relief valve or combination of valves on each hot water storage tank. Temperature sending element shall extend into water inside tank.

b. A combination pressure and temperature relief valve on each water heater not connected to a storage tank. Temperature sensing element shall extend into water inside heater tank. This valve shall be required in addition to any relief valve installed on cold water line.
5. Manual air vent valve assemblies shall be installed at each high point of hot water space heating and chilled water piping systems. Valves shall discharge through 1/4 inch diameter copper tubing and drain to nearest floor sink. Automatic type air vent valve shall only be installed where specifically indicated. Radiator, convectors, and finned pipe convectors shall be fitted with packless radiator valves, angle or straight pattern. Each convector or radiator installed as part of a space hot water heating system shall be furnished with a manual-type air vent valve.

P. Strainers: Strainers shall be installed on each water main downstream of the meter, above grade, when a pressure regulator assembly is not installed. Main strainer shall be of Y-flange type. On closed loop heating hot water systems pump systems, a strainer shall be installed at each pump inlet and upstream of each flow control valve assembly. The control valve assembly may include a modulating temperature control valve and a flow-limiting valve, manufactured by Griswold, AutoFlow, or equal.

Q. Hangers and Supports:

1. Piping shall be securely fastened to building structure by approved iron hangers, supports, guides, anchors, and sway braces to maintain pipe alignment to prevent sagging and to prevent noise or excessive strain on piping due to uncontrolled or seismic movement under operating conditions. Hangers and supports shall conform to Manufacturer's Standardization Society Specification SP-69. Hangers shall be relocated as required to correct unsatisfactory conditions that may become evident when system is placed into operation. Appliances, heat exchangers, storage tanks, and similar equipment shall be securely fastened to structure in accordance with seismic requirements. Outdoor metal hangers and supports shall be hot-dipped galvanized steel, unless otherwise specified.

2. Hose faucets, compressed air outlets, and similar items at ends of pipe branches shall be rigidly fastened to building construction near point of connection.

3. Piping shall not be supported by wire, rope, wood, plumbers' tape, or other non-recognized devices.

4. Hangers and supports shall be designed to support weight of pipe, fittings, weight of fluid and weight of pipe insulation, and shall have a minimum factor of safety of 5, based on ultimate tensile strength of material installed.

5. Burning or welding of and/or on any structural member under load is not permitted. Field welding not specified on the Drawings or reviewed Shop Drawings is not permitted without review by the Architect and DSA.

6. Burning holes in beam flanges or other structural members is not permitted without review by the Architect and DSA.

7. Pipe hangers on piping covered with low temperature insulation shall be installed on outside of insulation and not in contact with pipe unless otherwise detailed on Drawings. Insulation shall be protected by 18 gage galvanized steel shield, with a minimum length of 10 inches, installed completely around pipe covering between covering and hanger. Installing hangers directly on pipe and butting adjoining
sections of insulation against hanger is permitted provided void and hanger rod are properly insulated and sealed so that no sweating occurs at hangers.

8. Hanger rods shall be fastened to structural steel members with suitable beam clamps. Clamps shall be Grinnell, Carpenter and Patterson, or Fee and Mason, as follows:
   a. Grinnell I-beam, Figure 131, for maximum of 370 lbs.
   b. Grinnell I or WF beam, Figure 218, for maximum of 1365 lbs.
   c. Grinnell Channel Clamp, Figure 226 for maximum of 1140 lbs.

9. Hanger rods shall be fastened to concrete inserts in concrete slabs or beams. Inserts shall be Grinnell, Carpenter and Patterson, or Fee and Mason, as follows:
   a. Grinnell, Figure 285 for maximum of 400 lbs.
   b. Grinnell, Figure 282 for maximum of 1140 lbs.

10. For fastening to wood ceilings, beams, or joists, furnish Grinnell figure 128 or 202 pipe hanger flange fastened with drive screws. Under wood floors, 3/8 inch hanger rods shall be hung from 2 inch x 2 inch x 1/4 inch angle clips 3 inches long, with 2 staggered 10d nails, clinched over joist.

11. 3/8 inch hanger rod sizes inch for copper, iron, or steel pipe sizes 1/2 inch through 2 inches, 1/2 inch for pipe sizes 3 inches, 4 inches and 5 inches, 5/8 inch for pipe size 6 inches, and 3/4 inch for 8 inches and 10 inches pipe.

12. Turnbuckles, if furnished, shall provide a load carrying capacity equal to that of the pipe hanger with which they are being installed.

13. Pipe hangers shall be of same size, or nearest larger manufactured size available, as pipe or tubing on which they are being installed.

14. Hangers, clamps, and guides furnished for support of non-metallic pipe shall be padded with 1/8 inch thick rubber, neoprene, or soft resilient cloth.

15. Where special pipe-supporting requirements in the Specifications conflict with any standard requirements specified herein, the Specification requirements shall govern.

16. Vertical Piping:
   a. Vertical pipe risers shall be securely supported with riser clamps of recognized type. Risers in reinforced concrete buildings shall be furnished with extension clamps fastened to pipe above each concrete floor slab with extended arms of clamp to rest on slab. Clamps shall be provided with lead or Teflon liners when installed on copper tubing. Clamps shall be plastic-coated when installed on non-ferrous pipe or tubing.
b. Copper tubing in sizes 1-1/2 inches and larger and steel pipelines passing up through building shall be supported at each floor of building or every 15 feet whichever is less.

c. Copper tubing sizes 1-1/4 inches and smaller shall be supported at not intervals not more than 6 feet on center. Special provisions shall be installed for vertical lines subject to expansion and contraction caused by operating temperature differences.

d. Vertical cast iron pipelines shall be supported from each floor and at its base. Malleable iron or steel pipe clamps with minimum thickness of 1/4 inch shall be furnished and fastened around pipe for support.

17. Horizontal Piping:

a. Pressure piping on roofs shall be supported from stands, trapezes, or structures so that the bottoms of pipes clear the roof surface by 10 inches.

b. Insulated steam, space heating hot water, insulated condensate lines, insulated domestic hot water supply and return piping shall be supported with Grinnell figure 212 steel hangers with welded eye rods to permit hinge movement at point of attachment of hangers. Hinge movement at point of support shall be provided by welded eye linked rods Grinnell figure 278X.

c. Domestic cold water piping, chilled water supply and return piping, condenser water piping, insulated refrigerant piping, gas piping, compressed air piping, cast iron soil piping, galvanized steel vents, waste and downspout piping and glass may be supported with Grinnell figure 260 or figure 269 hangers with rods, tumbuckles and inserts suitable for above hangers.

d. Maximum hanger and support spacing shall conform to following schedule for horizontal piping installed above grade.

HANGER AND SUPPORT SPACING SCHEDULE

<table>
<thead>
<tr>
<th>Type of Pipe</th>
<th>1-1/2&quot; Pipe or Smaller</th>
<th>2&quot; Pipe or Larger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel; lightweight, rolled edges, grooved</td>
<td>7'</td>
<td>10'</td>
</tr>
<tr>
<td>Steel Pipe (except gas lines)</td>
<td>8'</td>
<td>10'</td>
</tr>
<tr>
<td>Copper Tubing</td>
<td>6'</td>
<td>10'</td>
</tr>
<tr>
<td>Steel Pipe, gas</td>
<td>6'</td>
<td>10'</td>
</tr>
<tr>
<td>IPS Brass Pipe</td>
<td>8'</td>
<td>10'</td>
</tr>
<tr>
<td>Cast Iron Soil Pipe</td>
<td></td>
<td>5' Maximum</td>
</tr>
</tbody>
</table>

A hanger or support shall be installed close to the point of change in direction of a pipe run, in either a horizontal or vertical plane.
19. When practicable, supports and hangers for cast iron soil pipe shall be installed as close as possible to joints and when hangers or supports are not located within one foot of a branch line fitting, an additional hanger or support shall be installed at fitting.

R. Flashings:

1. Each pipe, duct, or gas-fired equipment vent passing through roof shall be installed with waterproof flashing.

2. Flashing or flanges on pipes, vents, and ducts passing through a tile or slate roof shall be constructed of sheet lead. Flashing for pipes and heater vents passing through roofs other than tile or slate shall be galvanized sheet metal or aluminum. Flashing and flanges for ducts through roofs other than tile or slate and through exterior walls shall be same material and gage as duct. Flanges and flashing shall be installed waterproof at point of connection with pipe or duct.

3. Lead flashing and flanges shall be constructed of 4 pound sheet lead with burned joints. Flange of lead flashing or lead flange on a duct shall extend out onto roof a minimum of 12 inches from pipe or duct. Lead flashing shall extend up the pipe or duct not less than 7 inches.

4. Sheet metal flashing shall be constructed of 24 gage galvanized sheet steel. Flanges on these flashings shall extend out onto roof a minimum of 10 inches from pipe or duct. Flanges on ducts through exterior walls shall extend out from duct a minimum of 2-1/2 inches. Flanges on gas-fired equipment single-wall vents shall be of ventilated type. Type B gas vents through a roof shall be furnished with non-ventilated flashing as per National Fire Code, Pamphlet 211-1105.

5. Cast iron, steel, brass, and copper pipe, which terminates less than 18 inches above roof, shall be furnished with a combination counter-flashing and vandal-proof hood for protection against water, birds and foreign matter. Cast iron, steel, brass and copper pipe, which does not terminate within 18 inches of roof, shall be furnished with a counter-flashing sleeve. Pipe, which terminates more than 18 inches above roof, shall be furnished with protection against entrance of water, birds, and foreign matter.

6. Counter-flashing and combination counter-flashing sleeves and vandal-proof hoods shall be cast iron, vandal-proof, threaded, caulked or approved gas-heated sleeve type. Counter-flashing sleeves on each of these items shall extend down over flashing a minimum of 3/4 inch.

7. Flashing and flanges on ducts shall be installed waterproof at point of connection to the duct by riveting and soldering. Storm collars shall be securely screwed and installed waterproof around appliance vent pipe immediately above flashing.

8. Vent piping above roof shall be furnished with a combination counter-flashing sleeve and vandal-proof hood.
END OF SECTION
SECTION 15070
MECHANICAL SOUND, VIBRATION, AND SEISMIC CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes: Reduction or elimination of excessive noise or vibration within building due to operation of equipment, machinery, piping, and ductwork as specified.

1. Vibration isolators.
2. Seismic restraint devices.
3. Duct silencers.
4. Acoustic housings.
5. Lining and enclosing ductwork.
6. Acoustic louvers.
7. Sound attenuation boots at supply, return, exhaust and transfer air inlets, outlets and openings.
8. Flexible ducts.

C. Related Sections:

1. Section 15180: Heating and Air Conditioning Piping System.
4. Section 15600: Refrigeration Equipment.
5. Section 15700: Heating, Ventilating and Air Conditioning Equipment.

1.2 PERFORMANCE REQUIREMENTS

A. Provide sound level of spaces at levels not to exceed those listed below by furnishing acoustical devices indicated to provide specified sound levels.

B. Provide rooms and spaces with the following maximum sound levels, in dbA.
1. Auditorium 50
2. Classrooms 45
3. Offices 50
4. Work areas 50
5. Other type of rooms in dbA corresponding to the Room Criteria (RC) or Noise Criteria (NC) as defined in the ASHRAE Applications Handbook, Chapter 46.

C. Performance Requirements:

1. Aerodynamic and acoustic performance tests on equipment and duct silencers shall be conducted by an independent laboratory on a production unit.

2. Submit results with submittals.

3. Dynamic insertion loss values for silencers shall be measured by an independent NVLAP accredited laboratory in accordance with ASTM E 477 standards on a unit with a minimum face area of 4 sq. ft.

4. In general, silencers shall be selected for acoustical efficiency plus energy savings.

5. Acoustically absorptive filler material shall be inorganic mineral or glass fiber and shall be resistant to vermin and moisture and shall meet 25/50 flame and smoke spread when tested in accordance with ASMT E 84.

1.3 VIBRATION ISOLATION AND SEISMIC RESTRAINTS

A. Provide vibration isolators to eliminate or reduce the transmission of vibration noise to any part of building.

B. Provide vibration isolators to mitigate vibration frequency and load imposed by equipment. Isolator units shall be furnished with adequate strength and flexibility to provide proper resiliency under equipment weight and load impact without permitting excessive movement when starting.

C. Where fabricated vibration isolator units are indicated, furnish manufacturer's standard catalog products with printed loading ratings.

D. Seismic Requirements:

1. Refer to Guidelines for Seismic Restraints of Mechanical Systems published by SMACNA, approved by DSA, for minimum seismic restraints required on mechanical components design and construction details.

2. Provide seismic restraints for mechanical equipment or components specified. Where equipment is specified with proprietary names, design for seismic restraints is for first proprietary name listed.
3. Provide restraints, bracing and anchorage as required for the mechanical equipment, electrical equipment and components specified in the Contract Documents. Restraints, bracing and anchorage shall be installed to resist the total design earthquake or wind loads in any direction in accordance with CBC Code and SMACNA guidelines.

4. Provide restraints, bracing, and anchorage for the mechanical equipment and components.

5. For rigidly mounted liquid filled steel pipe, comply with the following:
   a. Provisions of NFPA Pamphlet 13, Section 3 for sway bracing.
   b. Provisions of NFPA Pamphlet 13, Section 3 for earthquake protection.
   c. Hanger spacing as specified in Section 15050 under Hanger Spacing Schedule.
   d. SMACNA Guidelines for Seismic Restraints, of Mechanical Systems and Plumbing Piping and approved by DSA.

6. For flexibly mounted liquid filled steel pipe, comply with the following:
   c. Installer may provide a DSA or OSHPD approved system such as the SMACNA Guidelines with Addendum No. 1, the Mason Industries Seismic Restraint Guidelines or other proprietary pre-approved system.

7. For ductwork and other mechanical equipment restraints, comply with SMACNA Guidelines for Seismic Restraints of Mechanical Systems and Plumbing Piping Systems and approved by DSA.

1.4 SUBMITTALS

A. Provide in accordance with Division 01.

1. Catalog cuts and data sheets on specific vibration isolators, seismic restraints, and anchors demonstrating compliance with the Specifications.

2. Shop Drawings for each piece of equipment including dimensions, structural member size, support point, vibration, and seismic restraints.

3. Written approval of frame design to be furnished by the equipment manufacturer.
4. Drawings indicating methods for suspension, support, seismic restraints, guides, etc., for piping, ductwork, etc.

5. Drawings indicating methods for isolation of pipes, ducts etc., piercing slabs, beams, etc.

1.5 QUALITY ASSURANCE

A. Standards and Codes: Comply with applicable codes and standards having jurisdiction including, but not limited to:


4. CBC.

5. VISCMA Seismic Control Device Installation, Best Practices Manuals

B. Qualifications of Manufacturer and Installers: Comply with provisions as set forth in Section 15010: Basic Mechanical Requirements.

PART 2 - PRODUCTS

2.1 GENERAL

A. Furnish and install vibration dampers, sound isolation pads, flexible connections and similar equipment required to prevent sound of water flowing in pipes, vibration of motors, and motor operated equipment from being transmitted to building structure; and, in case of fans, from being transmitted along ducts. Hot, tempered, and cold water lines shall be isolated from hangers, clamps and structural members by furnishing a commercially manufactured assembly of a hair felt or neoprene pad, cemented in a galvanized iron sleeve. Piping shall be isolated from vibrating equipment by furnishing required flexible connectors.

B. Fans, except curb-mounted roof-type exhaust fans and wall mounted propeller fans, shall be installed with anti-vibration units, whether indicated on Drawings or not. Fans built into air handling units may be furnished with independent anti-vibration mountings or whole unit may be installed.

C. Other equipment shall be installed on anti-vibration bases, pads, or hangers, unless specifically noted otherwise on Drawings. Package units, furnished with built in anti-vibration bases, do not require unit bases unless otherwise specified.

1. Unless specified otherwise, anti-vibration bases shall be Mason, M.W.Sausse, California Dynamics, Vibrex, or Korfund. Furnished base including sub-base, shall be manufactured by same company with fan and integral motor base. Seismic restraints may be incorporated into bases or furnished separately.
2. Inertia anti-vibration bases shall conform to requirements indicated.

3. Unless noted otherwise, furnished anti-vibration bases, including supporting units for inertia bases, shall be of the spring type.

4. Selection of bases or supporting units shall be in accordance with manufacturer's recommendations based on following installed minimum effective isolation efficiencies (where not provided with each piece of equipment):
   a. Centrifugal fans, packaged fan and coil units and cooling towers, less than 800 RPM
      80 percent
   b. Centrifugal fans over 800 RPM
      90 percent
   c. Centrifugal pumps
      95 percent
   d. Reciprocating compressors
      95 percent

D. Flexible duct connections shall be furnished and installed at inlet and outlets of each fan, or ventilating unit, except curb-mounted roof exhaust fans.

E. Flexible connections for freon piping shall be seamless flexible metal hoses of type and length recommended by manufacturer and suitable for system operating pressure.

F. Flexible connections for all other piping shall be flexible metal hose or spool type with flanged ends, unless otherwise specified. Metal hose shall be covered with protective braiding in areas where physical abrasion may occur, or for personnel safety.

G. Spool types shall be similar to American Rubber Co., Mercer Rubber Co PROCO, and hose types shall be D.M.E., Inc., U.S. Flex, Pennflex, Anaconda Flexpipe or Keflex with any required modifications to meet specified requirements. Flanges shall be furnished with steel retaining rings. Units installed on discharge side of pumps shall be furnished for a suitable working pressure of not less than 100 psig, and those on suction side for working pressures of 50 psig or 30 inches Hg vacuum.

H. Units installed in cold water lines (less than 125 degrees F.) shall furnish a minimum temperature rating of 180 degrees F. and those installed in hot water lines (above 125 degrees F.) shall be constructed of special heat resistant materials and be furnished for a minimum temperature rating of 220 degrees F., continuous operation. Units shall be able to withstand a maximum lateral deflection of 3/8 inch. Temperature and pressure ratings shall be molded into body of each spool unit so they are easily identified. Spool types shall be for straight in flow only.

I. Spool type units shall be furnished with control units comprised of a minimum of 2 tie-rods and anchor plates or internal guide sleeves to prevent excessive elongation or misalignment. Rubber washers shall be provided under bolt heads and rubber grommets in bolt holes to prevent any metal to metal contact between bolts and flanges.

J. Where hose type units are furnished, restraining anchors or braces shall be provided if excessive or undesirable pipe movement occurs when system is operated.
2.2 GENERAL PROPERTIES OF VIBRATION ISOLATORS.

A. Shall be provided with markings so that, after adjustment, when carrying their load, deflection under load can be verified; thus determining that load is within proper range of device and that correct degree of vibration isolation is being provided according to the design.

B. Isolators to operate in direct proportion to their load versus deflection curve. Load versus deflection curves shall be furnished by manufacturer and must be linear over a deflection range of 50 percent above design deflection.

C. Wave motion through isolator shall be reduced to following extent: Isolation above resonant frequency shall follow theoretical prediction based upon an un-dampened single degree of freedom system with a minimum isolation of 50 decibels above 150 cycles per second.

D. Vibration isolator spring diameters shall be no less than their deflected height. Furnish spring with a 50 percent overload safety factor.

E. Unless otherwise indicated, equipment installed on vibration bases shall provide a minimum operating clearance of one inch between structural steel base and floor or support base. Provide flexible connectors in piping and flexible conduit in power wiring to minimize transmission of vibration.

F. Isolators and springs exposed to weather shall be hot-dipped galvanized or powder coated after fabrication and before installation. Hot-dipped zinc coating shall be not less than 2 ounces per square foot by weight complying with ASTM A 123. In addition, provide limit stops to resist wind velocity.

G. Where indicated, provide structural steel bases with height saving brackets, and minimum of 3 points of support. Isolators shall be furnished with a method for leveling.

H. Design isolators and seismic restraints for positive anchorage against uplift and turning.

I. Provide and install, under this section of the Specifications, structural steel required to properly support equipment and steel required to support horizontal thrust arrestors.

2.3 ISOLATOR TYPES

A. Type A: Steel Spring Isolators: Un-housed steel spring isolators, laterally stable and unrestrained. Design springs so that ratio of horizontal to vertical spring (stiffness) constant is between 0.9 and 1.3. Natural frequency of isolator must be 1/3 to 1/4 of driving frequency that is to be controlled. Isolators to provide a minimum additional travel to solid equal to 50 percent of rated deflection. Isolators shall be furnished with built-in leveling bolts complete with sound isolation pads type B. Static deflection as specified herein. Isolation pads shall be 50 percent wider than the outside diameter of the spring.

B. Type B: Sound Isolation Pad: Provide under each spring isolator a sound isolation pad, utilizing high quality durable neoprene pad material, loaded to 40 psi. Build sound pad up to 2 layers of 1/4 inch thick neoprene material; separate layers with a 16 gage galvanized sheet metal plate. Top layer shall provide a hardness of 40 durometers and the bottom layer shall be 40 durometers. Cold bond sound pads together and to isolator baseplate.
C. Type C: Neoprene-in-Shear Isolators: Isolator shall be neoprene-in-shear type as recommended by manufacturer. Isolator shall provide a static deflection under rated load at 3/8 inch.

2.4 EQUIPMENT FRAMES

A. Provide mounting frames and brackets to carry load of equipment without causing mechanical distortion or stress to the equipment.

B. Type A Frame: Wide flange members, rigidized structural steel frame with brackets. Maximum allowable deflection at any point on load frame relative to unloaded frame shall be 0.005 inch. Members to be constructed of wide flange beams, with a depth of not less than 1/10 of length of span between isolators. Frame shall be Mason Industries type WF, M.W. Sausse type RMSB-W, or equal.

C. Type B Frame: Channel members, rigidized structural steel frame with brackets. Frame to be constructed of channel steel with section depth equal to 1/10th length of longest structural member. Frame shall be Mason Industries type MSL, M.W. Sausse type RMSB_C, or equal.

D. Type C Frame: Steel gusset or bracket welded or bolted directly to machine frame in order to accommodate isolator. Frame shall be Mason Industries type HSB, M.W. Sausse type RMSG, or equal.

E. Type D Frame: Fabricated of rectangular channel steel forms for floating foundations to be filled with concrete on the Project site. Channel depth to be a minimum of 1/12th of longest dimension, but in no case less than 6 inches. Form shall include 1/2 inch reinforcing bars installed each way in a layer 1-1/2 inches above bottom and drilled steel members with sleeves mounted below holes to receive equipment anchor bolts. Weight of concrete and frame shall be two times or more than the weight of the unit it supports. Frame shall be Mason Industries type KSL, M.W. Sausse type RMSBI, or equal.

2.5 MATERIALS AND CONSTRUCTION

A. Duct Silencers: Provide factory fabricated duct silencers of tubular or rectangular type, for high or low velocity service, with arrangements, sizes, and capacities as indicated on the Drawings.

1. Construction:

a. Fabricate silencers of galvanized steel with casing seams sealed or welded to be airtight at a pressure differential of 8 inches water gage between inside and outside of unit, and stiffen or brace as necessary to prevent structural failure or deformation at same condition, or audible vibration during normal operation. Outer casings of rectangular silencer modules shall be made of 22 gauge galvanized steel in accordance with ASHRAE Guide of recommended construction for high-pressure rectangular ductwork. Seams shall be lock formed and mastic filled. Outer casings of tubular silencers shall be made of galvanized steel in 18 gauge - 22 gauge. Internal acoustic elements of rectangular silencers shall incorporate integral die formed entry and exit to minimize pressure drop.
and self-noise. Interior partitions for rectangular silencers shall be fabricated of not less than 26 gauge galvanized perforated steel. Interior construction of tubular silencers shall be compatible with the outside casings.

b. Filler material shall be of inorganic mineral or glass fiber of a density sufficient to obtain the specified acoustic performance and be packed under not less than 5 percent compression to eliminate voids due to vibration and steeling. Materials shall be inert, vermin and moisture proof. Combustion rating for the silencer acoustic fill shall not be greater than the following when tested in accordance with ASTM E 84, NFPA Standard 255 or UL No. 723:

Flamespread classification 20
Smoke development rating 20

c. Airtight construction shall be provided by furnishing a duct sealing compound installed on the Project site. Silencers shall not fail structurally when subjected to a differential air pressure of 8 i.w.g. inside to outside of casing.

2. Acoustic Performance: Silencer ratings shall be determined in a duct-to-reverberant room test facility, which provides for airflow in both directions through the test silencer in accordance with ASTM Standard E477. The test facility shall be NVLAP accredited for the ASTM E 477 test standard. Data from a non-accredited laboratory is not permitted. The test set-up and procedure shall eliminate effects due to end reflection, directivity, flanking transmission, standing waves, and test chamber sound absorption. Acoustic ratings shall include dynamic insertion loss (DIL) and self-noise (SN) power levels both for forward flow (air and noise in same direction) and reverse flow (air and noise in opposite directions). Data shall be for test silencers no smaller than the following cross-sections:

Rectangular, in. - 24 x 24, 24 x 30, or 24 x 36
Tubular, in. - 12, 24, 36 and 48

3. Aerodynamic performance: Airflow measurements shall be performed in accordance with ASTM specification E 477 and applicable portions of ASME, AMCA, and ADC airflow test codes. Tests shall be reported on the identical units for which acoustic data is presented.

4. Certification: With submittals, provide certified test data on dynamic insertion loss, self-noise power levels, and aerodynamic performance for reverse and forward flow test conditions. Test data shall be for a standard product. Rating tests shall be conducted in the same facility, shall utilize the same silencer, and shall be open to inspection if required by the Architect.
5. Rectangular silencers shall be IAC type ES Energy Saver silencer provided the acoustical performance is satisfactory.

B. Duct Liner: As indicated in Section 15080: Mechanical Insulation.

C. Flexible Ducts: As indicated in Section 15080: Mechanical Insulation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install isolators as required for installation of mechanical components to prevent transmission of vibration noise to any part of building.

B. Install isolators to suit imposed load and the vibration frequency to be absorbed. Isolator units shall furnish adequate strength and flexibility to exhibit proper resiliency under machine load and impact without permitting excessive movement when starting.

C. Where commercial vibration isolator and seismic restraint units are specified, furnish manufacturer's standard catalog products with printed loading ratings, or provide substantiating calculations.

D. Install vibration isolators and seismic restraints in accordance with manufacturer's printed installation instructions.

E. Where equipment is belt driven and motor is not installed on equipment, install motor, and driven equipment on unitized support, and install entire support isolators. Unitized support to be provided with adjustable slide rails sized for motor weight and frequency. Support shall be Mason Industries type WF, M.W. Sausse type RMSF, or equal.

F. Do not install any equipment, piping, conduit, ductwork, etc., that makes rigid contact with building or its structural members, unless reviewed by the Architect.

1. Coordinate Work with other trades to avoid rigid contact with building.

2. Correct, before installation, any conflict with other Work that would result in solid contact to equipment or piping due to inadequate space.

3. Obtain inspection from the IOR for concealed Work before enclosure.

4. Notify manufacturer before installation of vibration isolation devices so that manufacturer may instruct and demonstrate technique for proper installation.

G. The furnishing or installation of vibration isolators must not cause any change of position or alignment of equipment, ductwork, or piping, resulting in stresses in piping or ductwork, connections, or misalignment of shafts or bearings. Equipment, piping, and ductwork shall be maintained in a rigid position during installation. Load shall not be transferred to isolator until installation is complete and under full operational load.

H. Air Conditioning Units and Floor Mounted Fans: Install entire casing including filters, mixing box, fan section, coil sections, etc., on a continuous, integral, structural steel base, as
indicated. Furnish type A, B, or C frames, reinforced as necessary to prevent distortion of frame. Furnish isolator type A; static deflection shall be minimum of 1-1/2 inches

I. Suspended Fans and Air Conditioning Unit Fan Coils and Unit Ventilators: Suspend each integral unit from overhead structure on steel spring and elastomer hanger isolators and support deflection under rated load of 3/8 inch. Provide spring static deflection as follows:

<table>
<thead>
<tr>
<th>Fan RPM</th>
<th>Min. Deflection</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 - 400</td>
<td>3 inches</td>
</tr>
<tr>
<td>400 - 700</td>
<td>2 inches</td>
</tr>
<tr>
<td>Above 700</td>
<td>1 inches</td>
</tr>
</tbody>
</table>

J. Pipe Isolation: Where indicated and as required, furnish and support each pipe from an isolator. Isolator for the first 5 support locations away from vibrating equipment shall have the same deflection as the equipment isolators. After that, isolators shall be a neoprene-in-shear type of size as recommended by manufacturer; except where indicated on Drawings, pipe hanger rod shall be furnished with a steel spring isolator and elastomer element, with lower rod capable of 30 degrees total mis-alignment without contact on spring housing.

K. Seismic Restraints: Floor or pad mounted equipment, without vibration isolators, shall be bolted to floor or other support. Floor mounted equipment with vibration isolators shall be provided with lateral and vertical restraining devices on all sides of base to restrict displacement of equipment. On all sides of suspended equipment, provide bracing for rigid supports and provide aircraft cable restraints for resiliently supported equipment.

3.2 EXAMINATION

A. Arrange for the services of a certified representative of isolation manufacturer to visit the Project site for inspecting installation of devices. In the event the isolators do not meet specified requirements perform necessary revisions. Submit a written report to the Architect signed by above representative indicating all devices are properly installed and are operating as specified or required by isolation manufacturer.

END OF SECTION
SECTION 15075

MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes: Provide marking and identification required on mechanical piping systems, ducts, controls, valves, apparatus, etc., as specified in this section or any related sections.

C. Related Sections:

1. Section 15050: Basic Mechanical Materials and Methods.
2. Section 15180: Heating and Air Conditioning Piping System.
4. Section 15400: Plumbing.
5. Section 15600: Refrigeration Equipment.
7. Section 15800: Air Distribution.
8. Section 15900: HVAC Instrumentation and Controls.

1.2 SUBMITTALS

A. Submit in accordance with Division 01 and Sections 15010: Basic Mechanical Requirements.

B. Submit Samples of materials.

1.3 QUALITY ASSURANCE

A. Comply with provisions of Section 15010: Basic Mechanical Requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Piping systems, controls, valves, apparatus, etc., except those that are installed in inaccessible locations in partitions, walls, and floors, and those installed directly below grade, shall be permanently identified.

2.2 VALVES

A. Furnish prepared chart or diagram for each piping system, indicating by identifying letter or number each valve in the system, its location, and function.
B. Install charts in aluminum frame with clear glass front and secure on wall where designated by the IOR.

C. Bind copies of each chart in operating instructions manual.

D. Provide each valve with a brass, aluminum, or plastic disc, not less than 1-1/4 inches diameter bearing engraved numbers corresponding to those indicated on chart. Fasten discs to valve with No. 14 brass wire.

E. Provide an additional tag for safety valves and other valves that could be hazardous to safety and health of occupants. Distinguish these tags from regular valve tags by color (such as yellow with black letters, and marked "Danger"); submit Sample tag to the Architect for review.

2.3 INSTRUMENTS AND CONTROLS

A. Identify panel-mounted instruments and controls with engraved bakelite nameplates permanently affixed to panel boards.

B. Identify alarm indicating devices and alarm reset devices by nameplates.

C. Identify damper motors and automatic valves, flow switches, pressure switches, etc., with embossed aluminum or plastic tape affixed to controller, indicating service and setting.

2.4 EQUIPMENT

A. Identify each major piece of equipment with stenciled designation corresponding to its designation on the Drawings.

2.5 PIPELINES IDENTIFICATION

A. Identify pipes by means of colored labels with directional flow arrows as indicated in schedule.

B. Materials: Waterproof plastic cloth, all-temperature, self-adhering, or markers similar to Western Tel-A-Pipe, Type I, W.H. Bradley Co., or equal.

C. Size: For pipes up to 3 inches diameter, 2-1/4 inches x 9 inches minimum, with 1/2 inch letters; for pipes over 3 inches diameter, 2-1/4 inches x 9 inches minimum, with 1-1/2 inch letters.

D. Colors:
   1. Backgrounds: As indicated in schedule.
   2. Letters: White on red background; black on all other backgrounds.

E. Locations:
   1. On accessible piping, whether insulated or not (including mechanical rooms, attic and ceiling spaces); except that labels shall be omitted from piping where contained material is obvious due to its connection to fixtures (such as faucets, water closets, etc.).
   2. Near each valve and branch connection in such accessible piping.
3. At each pipe passage through wall or floor.
4. At not more than 40 feet spacing on straight pipe run between bands required in 2 and 3 above.
5. At each change in direction.

F. Application: Install on clean surfaces free of dust, grease, oil, or any material that will prevent proper adhesion. Replace non-adhering or curling labels with new labels, as required by the IOR.

1. Furnish spray adhesive on insulated pipes in addition to adhesive on marker.
2. Finish exposed markers with one coat of lacquer.

G. Schedule:

<table>
<thead>
<tr>
<th>Content of Pipe</th>
<th>Legend</th>
<th>Color</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic cold water</td>
<td>Dom. c.w.</td>
<td>G</td>
<td>*</td>
</tr>
<tr>
<td>Non-potable cold water</td>
<td>NP c.w.</td>
<td>G (1)</td>
<td>*</td>
</tr>
<tr>
<td>Domestic hot-water 140 degrees F.</td>
<td>Dom h.w.</td>
<td>Y</td>
<td>*</td>
</tr>
<tr>
<td>Sanitary waste</td>
<td>San waste</td>
<td>G</td>
<td>*</td>
</tr>
<tr>
<td>Sanitary vent</td>
<td>San vent</td>
<td>G</td>
<td>*</td>
</tr>
<tr>
<td>Storm drain or downspout</td>
<td>Storm drain</td>
<td>G</td>
<td>*</td>
</tr>
<tr>
<td>Indirect drain</td>
<td>Ind drain</td>
<td>G (1)</td>
<td>*</td>
</tr>
<tr>
<td>Fire sprinkler supply</td>
<td>Sprinkler supply R</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Fire sprinkler drain</td>
<td>Sprinkler drain</td>
<td>R</td>
<td>*</td>
</tr>
</tbody>
</table>

H. Notes on Schedule:

1. Symbol * indicates flow arrow required.
2. Symbol (1) indicates 2-1/4 inches x one inch yellow label with 1/2 inch letters reading UNSAFE WATER at one end of primary label.
3. Hyphen between words indicates 2 separate stock labels are required, although a single special label with all lettering is permitted.
4. Background colors: Symbol Y indicates yellow background color. Symbol G indicates green background color. Symbol R indicates red background color. All letters shall be in black print.

2.6 UNDERGROUND PIPE MARKERS

A. Pipe markers shall be furnished to grade at each horizontal change in direction for non-metallic underground pipe. Markers shall be concrete plaque inscribed with the appropriate
word (gas, water, sewer, air, etc.). Cleanouts to grade may serve as direction markers for waste lines. An electrically continuous No. 14 plastic covered copper tracer wire, Type TW, shall be installed in trench along pipe. Wire shall be fastened to pipe at not greater than 20 foot intervals. Wire shall terminate above grade with a 12 inch wire lead taped around each riser. Straight line transitions of metallic to non-metallic pipe shall be marked by installing tracer wire lead to grade under a marker.

B. Tracer wires for non-metallic pipe shall be color-coded as follows:

1. Gas: Yellow
2. Domestic Water: Blue
3. Fire Sprinkler: Red
4. Irrigation: Green

2.7 IDENTIFICATION OF AIR CONDITIONING EQUIPMENT

A. Provide identification markers to locate air conditioning equipment above T-bar ceilings. Install 3/4 inch to one inch diameter colored self-adhesive dots to T-bar ceiling grid indicating point of access. The following identification markers shall be recorded on the project record documents:

1. Fire Damper: Red
   a. Supply air: Full dot
   b. Return air: Half dot.
3. Fan coil unit: Green
4. Filter Location if separate from fan coil: Yellow

PART 3 - EXECUTION

3.1 INSTALLATION

A. Correct detrimental conditions prior to commencing the Work of this section. Install markers and identification tags as specified with materials and installation procedures recommended by manufacturer.

3.2 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION
SECTION 15080
MECHANICAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes: Insulation furnished and installed under this section shall meet minimum legal requirements of the Building Energy Efficiency Standards adopted and incorporated in the California Energy Commission, Title 24, Part 2, Chapters 2 through 53, unless otherwise noted, for the following piping, ductwork, and equipment:

1. Condensate drain piping from air conditioning equipment.
2. Refrigerant piping.
3. Supply and return heating and cooling systems air ducts.
4. Plumbing piping and equipment including hot and tempered domestic water supply and return piping.

C. Related Sections:

1. Section 15010: Basic Mechanical Requirements.
2. Section 15050: Basic Mechanical Materials and Methods.
3. Section 15075: Mechanical Identification.
5. Section 15400: Plumbing.
7. Section 15800: Air Distribution.

1.2 SUBMITTALS

A. Submit in accordance with Division 01 and Section 15010: Basic Mechanical Requirements.

1. Complete material list of items to be furnished and installed under this section.
2. Manufacturer's specifications and other data required demonstrating compliance with the specified requirements.
3. Shop Drawings, catalog cuts and manufacturer's data indicating insulation, jacketing, adhesives, and coating. Insulating materials shall be certified by manufacturer to comply with the California quality standards for insulating material.
4. Display Sample cutaway sections.
5. Manufacturer's recommended method of installation procedures, which will become part of this Specification section.

1.3 QUALITY ASSURANCE

A. Qualifications of Manufacturer and Installer, Workmanship and Standard of Quality: Comply with provisions stated under Section 15010: Basic Mechanical Requirements and Section 15050: Basic Mechanical Materials and Methods.

B. Insulation Work shall be in accordance with the State of California Building Energy Efficiency Standards, CBC, and Uniform Mechanical Code.

C. Test Ratings:

1. Comply with provisions stated under Section 15010 and 15500 with emphasis on ASTM E 84, NFPA 255, or UL 723. ASTM C 167, ASTM C 302, UL label or listing of satisfactory test results from the National Bureau of Standards, or a satisfactory certified test report from an acceptable testing laboratory. Approval by the State Fire Marshal is required.

2. Furnish labels, legibly printed with the name of the manufacturer or listings indicate that fire hazard ratings do not exceed those specified for materials proposed for installation. Flame spread not more than 25 and smoke developed not exceeding 50.

3. Tests shall be performed on each item individually when insulation, vapor barrier covering, wrapping materials, or adhesives are installed separately at the Project site.

4. Test insulation, vapor barrier covering, wrapping materials and adhesives as an assembly when they are factory composite systems.

1.4 PRODUCT HANDLING

A. Protection, Replacement, Delivery and Storage: Comply with provisions stated under Sections 15010: Basic Mechanical Requirements and 15050: Basic Mechanical Materials and Methods.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:

1. Insulating material shall be fire resistant, non-corrosive, shall not break, settle, sag, pack or disintegrate under vibration, nor absorb more than 1 percent moisture by weight.

2. Insulating material shall be furnished with thickness indicated in Table 1, and shall furnish thermal resistance in the range of R 4.0 to 4.6 in accordance with inch at 75 degrees F. For any other value of R, insulation thickness shall be calculated accordingly and submitted for review.

3. Asbestos in any quantity in insulating material is not permitted.
4. Provide insulation materials, adhesives, coatings, sealants, fitting covers, and other accessories with a fire hazard rating not to exceed 25 for flame spread, 25 for fuel contributed and 50 for smoke developed, except for materials listed as follows:
   a. Nylon anchors for installing insulation to ducts or equipment.
   b. Treated wood blocks.

5. Flameproofing treatments subject to moisture damage are not permitted.

<table>
<thead>
<tr>
<th>PIPING FLUID TEMP SYSTEM RANGE</th>
<th>NOMINAL PIPE DIAMETER (INCHES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE (DEGREES F.) up to (2)</td>
<td>Runouts 1 and 8 and Larger</td>
</tr>
<tr>
<td></td>
<td>Less 1.25-2 2.50-4 5-6 Larger</td>
</tr>
</tbody>
</table>

Insulation Thickness Required (in inches)

Space Cooling Systems (Refrigerant)

Refrigerant Below 40 1.0 1.0 1.5 1.5 1.5 1.5

Condensate Drain 1/2 inches Minimum insulation thickness.

From A/C Equipment: Insulate condensate drain lines within building, in room and in ceilings.

NOTES:

(1) For piping exposed to ambient temperatures, increase thickness by 0.5 inch.

(2) Runouts to individual terminal units, not exceeding 12 feet in length.

B. Lagging Adhesives: Insulation finished with canvas shall be provided with laps adhered with Childers Chil-Seal CP50A/AHV2 or Foster's Sealfas 30-36, or equal. A finish coat of CP50A or 30-36 shall be installed to entire outer surface of lagging cloth at coverage specified by manufacturer.

C. Canvas Jackets: Furnish 6 oz. in accordance with square foot minimum, 48 x 48 thread count canvas jacketing.

D. Insulation Jackets:

1. Exterior insulation exposed to weather shall be weatherproofed with Childers aluminum jacketing, or equal. Jacketing shall be manufactured from 1100, 3105 or 5010 aluminum alloy with 3/16 inch corrugations. Smooth or embossed jackets may be permitted in special situations to match an existing installation. Jacketing shall be furnished with an integrally bonded moisture barrier over entire surface in contact with insulation. A minimum thickness of 0.016 aluminum jacketing is to be provided on ducts and piping. A minimum thickness of 0.020 shall be provided on tanks, equipment, and heat exchangers.

2. Insulated elbows, of 90 degrees and 45 degrees, with a nominal iron pipe size of 1/2 inch to 8 inches shall be provided with Childers aluminum Ell-Jacs insulation covers, or equal, manufactured from 1100 aluminum alloy of 0.024 inch thickness. Insulated elbows with a nominal pipe size of 10 inches to 18 inches shall be provided with Childers 4-piece aluminum Ell-Jacs.
3. Tees, Flanges, and Valve Insulation in Conjunction with Aluminum Jacketing:
   Furnish Childers Aluminum Special Fabrications Insulation Covers as manufactured
   by Childers Products Company, or equal.

E. Adhesives: Adhesives shall be acceptable to the State Fire Marshal. Name, type and
   method of installation shall be submitted for review. Acceptable products are stated under
   each category of insulation Work in following paragraphs:

1. Duct Liner Edge Sealing (Adhesive Exposed to Air Stream): Childers Chil-Spray NF
   CP-89 or 3M Fastbond 38-NF for spray installation. For brush installation, furnish
   Childers Chil-Stix CP-82 or Foster’s Spark-Fas 85-20.

2. Duct Joint Sealing:
   a. Childers Chil-Seal CP50A/50AHVZ
   b. Foster’s Sealfas 30-36
   c. Borden Arabol 60-89-05 with canvas tape, minimum 2 inches width.

3. Duct Joint Caulking:
   a. Childers Veloseal CP-72
   b. 3M 321.

4. Valve and Fitting Cover: When installed in conjunction with PVC jacketing, furnish
   Zeston 25/50 rated polyvinyl chloride fitting covers as manufactured by Johns
   Manville, or equal.

2.2 SPACE HEATING PIPING SYSTEM AND DOMESTIC HOT WATER PIPING SYSTEM
   INSULATION

A. General: Insulate steam, steam condensate, return, vacuum return, hot water space
   heating supply and return, domestic hot water supply and return piping, including valves,
   strainers and fittings with insulation thickness as indicated on Table 1.

B. Materials:

1. Classes of Insulation:
   a. Class A: Calcium silicate molded pipe insulation, suitable for service
      temperature up to 1200 degrees F., ASTM C 533; Johns Manville Thermo
      12, Owens-Corning Kaylo-10, or equal. Fittings: diatomaceous silica
      thermal insulating cement, ASTM C 197.
   b. Class B: Glass fiber molded pipe insulation suitable for service
      temperatures up to 850 degrees F. Pipe insulation shall be one piece,
      preformed, and provide a minimum R factor of 4.0 at 75 degrees F. mean
      temperature. Insulation shall be faced with all-purpose fire retardant vapor
      barrier jacket. Pipe insulation shall be Johns Manville Micro-Lok, Certain-
      Teed Snap-On, or Owens-Corning ASJ/SSL II.
   c. Class C: Flexible open-cell melamine (foam insulation) suitable for service
      temperature -320 degrees F. to 400 degrees F. Thermal conductivity at 75
degrees F. K= 26. Pipe insulation, one-piece pre-formed, laminated to heavy non-reinforced PVC jacket, with locking track, factory installed to jacket, to snap insulation and jacket onto pipe. Similar to Thermazip insulating or Techlite Melamine Form Insulation System as manufactured by Accessible Products Co., or equal. Installation shall comply with manufacturers recommendations.

d. Class D: Mineral fiber pipe insulation suitable for service temperatures up to 1200 degrees F. Pipe insulation shall be one-piece, preformed up to 3 inches thickness, and provide a minimum R factor of 4.0 at 75 degrees F. mean temperature. Insulation shall be faced with all-purpose fire-retardant vapor barrier jacket. Pipe insulation shall be 8 pounds in accordance with cubic foot density by Industrial Insulation of Texas Inc. Delta Snap Wrap, Bradford Enercon Enerok, Lapinus 1200, or equal.

2. Locations and Class of Insulation Required:

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>CLASS OF INSULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical Equipment Room</td>
<td>A, B, C, or D</td>
</tr>
<tr>
<td>All Other Locations</td>
<td>A, B, C, or D</td>
</tr>
</tbody>
</table>

3. Fittings on indoor piping shall be covered with flush, hand-wrapped Class A, B, C, or D insulation, to match the adjoining pipe insulation and covered with polyvinyl chloride fitting covers: Zeston 2000 25/50 by Johns Manville, or equal.

4. Adhesive: Childers Fibrous Adhesive CP97, or equal, to bond calcium silicate to itself and non-porous surfaces.

2.3 COOLING PIPING SYSTEM INSULATION

A. General: Insulate refrigerant piping.

B. Materials:

1. Classes of Insulation:

a. Class A: Expanded polystyrene pipe insulation, self-extinguishing type, either molded or extruded; Dow Chemical Styrofoam FR, California Zonolite Co. Dyfoam, or Koppers Insulfoam.

b. Class B: Glass fiber molded pipe insulation ASTM C 547.

Pipe insulation shall be one piece, preformed, and provide a minimum R factor of 4 at 75 degrees F. mean temperature. Insulation shall be faced with all-purpose fire retardant vapor barrier jacket. Pipe insulation shall be Johns Manville Micro-Lok, Certain-Teed Snap-On, or Owens-Corning ASJ/SSL II.

c. Class C: Expanded (foamed) urethane (polyurethane) pipe insulation of self-extinguishing type molded or fabricated, UpJohn Co. CFR Division, Armstrong Armalok or Expando-foam, or Owens-Corning Urethane.
d. Class D: Foamed plastic pipe insulation, self-extinguishing type, ASTM C 534 Type 1 - tubular. Pipe insulation shall be one-piece preformed, flexible tubing type and provide a minimum K factor of 0.28 at 75 degrees F. mean temperature. Pipe insulation shall be Johns Manville Rubatex, Armstrong Armaflex II, or equal.

e. Class E: Mineral fiber pipe insulation ASTM C547. Pipe insulation shall be one piece preformed up to 3 inches thickness and provide a minimum R factor of 4 at 75 degrees F. mean temperature. Insulation shall be faced with all-purpose fire-retardant vapor barrier jacket. Pipe insulation shall be Industrial Insulation of Texas, Inc., Delta Snap Wrap, Bradford Enercon Enerok, or Lapinus 1200.

2. Locations and Class of Insulation Required:

<table>
<thead>
<tr>
<th>SERVICE</th>
<th>LOCATION</th>
<th>CLASS OF INSULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condensate drains from air conditioning equipment</td>
<td>Indoors at ceilings and in rooms</td>
<td>D</td>
</tr>
<tr>
<td>Refrigerant suction. Liquid line as required</td>
<td>All locations except underground</td>
<td>D</td>
</tr>
<tr>
<td>All other piping, except underground</td>
<td>All locations except underground</td>
<td>A, B, C, or E</td>
</tr>
</tbody>
</table>

3. Thickness: Refer to Table 1 of this section.

4. Adhesives:

a. Polystyrene adhesives: Childers Chil-Rene CP-96 or King Adhesive Co. 15-165.

b. Vapor barrier laps and penetrations: Furnish Childers Chil-Perm NF CP-32 or Epolux 660 on butt joints of foil-faced vapor barriers, and where pins and staples puncture facings.

2.4 DUCTWORK AND PLENUM INSULATION

A. General: Insulate ductwork and plenums with not less than the amount of insulation tabulated in Table 2. Insulation may be omitted under the following conditions:

1. Ceilings, which form return or relief plenums, need not be insulated.

2. Exposed return air ductwork in conditioned space.

3. Exposed supply air ductwork in conditioned space if the supply air temperature is higher than the maximum expected dew point temperature.

4. Return air ductwork between wall studs inside an interior wall.

5. Supply air ductwork between wall studs inside an interior wall if the supply air temperature is higher than the maximum expected dew point temperature.
### TABLE 2 - INSULATION OF DUCTS AND PLENUM

<table>
<thead>
<tr>
<th>Duct Location</th>
<th>Insulation Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>On roof or exterior of building</td>
<td>Cooling Only: F-3 and W Heating Only: F-1 and W</td>
</tr>
<tr>
<td>Attics, Garages, and Crawl Spaces</td>
<td>Cooling Only: F-2 Heating Only: F-1</td>
</tr>
<tr>
<td>In walls, within floor-ceiling spaces and hot and cold plenums</td>
<td>Cooling Only: F-2 Heating Only: F-1</td>
</tr>
<tr>
<td>Within the conditioned space or in basement above</td>
<td>As specified None Required</td>
</tr>
<tr>
<td>Concrete slabs or within ground</td>
<td>None Required None Required</td>
</tr>
</tbody>
</table>

**B. Insulation Types:**

1. **F-1:** One inch blanket fiberglass, factory-laminated with all-service jacket vapor barrier. Refer to the materials indicated in this section for external insulation below. Provide fiberglass duct liner as indicated.

2. **F-2:** 2 inches blanket fiberglass factory-laminated with all-service jacket vapor barrier. Refer to the materials indicated in this section for external insulation below. Provide one inch fiberglass blanket, duct liner as indicated.

3. **F-3:** 3 inches blanket fiberglass factory laminated with all-service jacket vapor barrier. Refer to the materials indicated in this section for external insulation. Provide one inch duct liner as indicated.

4. **W:** Weatherproof jacket, 0.016 inch thick aluminum, or stainless steel.

**C. Notes:**

1. Where ducts are utilized for both heating and cooling, minimum insulation provided shall be as required for the most restrictive condition.

2. Refer to the materials indicated in this section for external insulation and internal lining, this section, below.

3. Thickness of duct liners is based on type of installation.

**D. Materials:**

1. Fire-Resistive Insulation Materials and Coatings: Submit to the State Fire Marshal for approval.

2. Adhesives: See sub-sections 2.01, sections F, G, and H for applicable products.

3. External Insulation: Provide a minimum R value as required by the latest edition of the California Energy Efficiency Standards, but not less than 4.0 at 75 degrees F. (installed) glass fiber blanket, factory-laminated with reinforced foil Kraft (FRK)
vapor barrier facing; Johns Manville Microlite, Owens Corning all-service faced duct wrap, Ultralite No. 100, Pittsburgh Plate Glass Superfine, or Silvercote Silvercel.

4. Internal Lining: Johns Manville Permacote® Linacoustic® and/or Permacote® Spiracoustic®, or CertainTeed. Internal lining shall conform to NFPA 90A, shall be UL listed, and meet ASTM G21, 22 specifications, and State Fire Marshal approved.

a. Noise regulatory criteria (NRC).

(1) Duct lining: Minimum NRC of 0.75 for interior spaces and minimum NRC of 0.90 for exposed to weather.

(2) Hot and cold plenums separated by single partition: Minimum NRC of 0.75, both sides.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Except as specified herein, install material in accordance with recommendations of manufacturer. Do not install insulation materials until tests specified in other sections are completed. Remove foreign material such as rust, scale, or dirt. Surfaces shall be clean and dry. Maintain insulation clean and dry at all times.

B. On cold surfaces where a vapor barrier must be provided and maintained, insulation shall be installed with a continuous, unbroken moisture and vapor seal. Hangers, supports, anchors, or other projections that are fastened to cold surfaces shall be insulated and vapor sealed to prevent condensation.

C. Surface finishes shall be extended in such a manner as to protect raw edges, ends, and surfaces of insulation.

D. Pipe or duct insulation shall be continuous through walls, ceiling or floor openings, or sleeves; except where firestop or firesafing materials are required.

E. Metal shields shall be installed between hangers or supports and the piping insulation. Rigid insulation inserts shall be installed between the pipe and the insulation shields. Inserts shall be of equal thickness to adjacent insulation and shall be vapor sealed accordingly.

F. Insulation shall not be installed in the following locations unless otherwise noted:

1. On vacuum return lines less than 50 feet long.

2. On unions, flanged connections or valve handles.

3. Over edges of any manhole, clean-out hole, clean-out plug, access door or opening to a fire damper, so as to restrict opening or identification of access.

4. Over any label or stamp indicating make, approval, rating, inspection, or similar data, unless provision is made for identification and access to label or stamp.

3.2 INSTALLATION OF HEATING PIPING SYSTEM INSULATION

A. General: Space heating hot water, domestic hot water after having been tested, shall be cleaned and insulated.
B. Application: Insulate hot water heating supply and return piping, domestic hot water supply and return in accordance with manufacturer’s instructions and as specified herein.

1. Install insulation on valve bodies up to valve bonnet. Fill void in saddles, in accordance with Section 15050: Basic Mechanical Materials and Methods, with insulation and seal joints.

2. Install insulating material to fittings, valves, and strainers and smooth to thickness of adjacent covering. Leave strainer clean-out plugs accessible. Covers fabricated from polyvinyl chloride shall be furnished.

C. Insulation Jackets:

1. Exposed Indoor Locations:

   a. Cover completed insulation with canvas jacket tightly pasted to covering with lagging adhesive. Lap jacket seams 1-1/2 inches minimum. Finish entire jacket with coating of undiluted adhesive.

   b. Equivalent factory applied pre-sized, glass fiber reinforced, or glass fiber jackets may be furnished. Seal jacket seams with adhesive in accordance with manufacturer's instructions.

   c. Zeston 2000, or equal, fitting covers may be furnished, with molded or segmented insulation equal to specified insulation applied to fittings. Secure covers in accordance with manufacturer's instructions.

   d. In addition to above requirements, cover exposed insulated piping within a distance of 8 feet above floors with 26 gage galvanized steel jacket. Omit jacket in areas accessible only to maintenance personnel, such as mechanical equipment rooms, utility corridors, accessible pipe tunnels and manholes.

2. Concealed Indoor Locations: Cover insulation over fittings, valves, and strainers with canvas. Provide pipe insulation with factory or field applied standard jacket of 4 oz. minimum canvas, fiberglass cloth, or glass fiber reinforced jacket. Seal jacket laps with adhesive in accordance with manufacturer's instructions.

3. Exposed Outdoors: In addition to canvas or fiberglass cloth cover, pipe insulation exposed to weather shall be provided with an additional 0.016 inches thick aluminum jacket with 2 inches lap connected with one inch hem overlap joint located on side of pipe and turned down to shed water. Jacket shall be strapped 12 inches on center with 1/2 inches wide stainless steel strapping and wing seals. Aluminum jacket shall be mitered to fit fittings.

3.3 INSTALLATION OF COOLING PIPING SYSTEM INSULATION

A. General: Refrigerant piping and condensate drain lines, after having been tested, shall be cleaned and insulated.

B. Application: Insulation on refrigerant suction lines and liquid lines, if indicated, and air conditioner interior drain lines shall be jacketed with fire-resistant vapor barrier of laminated aluminum foil consisting of 2 plies with glass-yarn reinforcing. Jacket joints shall be lapped and sealed with an approved adhesive. Insulation shall be secured with aluminum bands.
not less than 0.005 inch thick by 3/4 inches wide, spaced not over 12 inches on centers, or as recommended by manufacturer.

1. Longitudinal Seams: Butt hinged sections of covering tightly together and seal down jacket flap with adhesive, Childers CP-82, Foster's 85-20, or equal, or with factory-applied, self-sealing lap with pressure-sensitive sealer protected with release paper.

2. End Joints: Wrap joint with a 3-inch wide (minimum) self-sealing tape.

3. Fittings and Valves: Fittings and valves shall be covered with same material of same thickness as pipe insulation, sealed with an approved, vapor-sealing tape or compound and covered with Zeston polyvinyl-chloride cover.

4. Pipe hangers shall be insulated or attached to pipe by an insulating insert, butted between adjoining insulation sections.

C. Additional Jackets:

1. Exposed Indoor Insulation: Cover with 26 gage galvanized sheet metal jacket to 8 feet above floors, except in mechanical equipment rooms and accessible pipe tunnels.

2. Exposed Outdoor Insulation: In addition to canvas or fiberglass cloth cover, provide 0.016 inch thick aluminum jacket with one inch wide aluminum bands and seals. Install appropriate jackets on valves and fittings.

3.4 INSTALLATION OF DUCTWORK AND PLENUM INSULATION

A. External Covering:

1. Before installing duct insulation, sheet metal ducts shall be clean, dry, and tightly sealed at joints and seams.

2. Duct exterior insulation shall be firmly wrapped around ductwork with joints lapped a minimum of 2 inches. Insulation shall be securely fastened with 18 gage copper-lined steel wire, or 16 gage soft-annealed galvanized wire spaced approximately 12 inches on centers and at loose ends, presenting a neat and workmanlike appearance. Where duct width is such that wiring will not fasten insulation firmly against duct an adhesive shall be furnished to fasten insulation to duct with wiring being installed at ends of insulation segment.

3. Duct insulation in finished rooms shall be covered with wrapped fiberglass cloth cover. Install on each corner of duct 26 gage galvanized steel small nose, wide flange corner bead of appropriate height. In unfinished rooms, the insulation shall have a vinyl or similar coating. In all rooms, insulation shall be fastened to the ducts with an approved adhesive instead of wire. Corners shall be cut and formed instead of bending the insulating material. Raw edges shall be taped.

4. Insulation on ductwork transporting conditioned air, both supply and return, and outside air intake ducts shall be furnished with a factory-applied, fire-resistant vapor barrier.

5. Exposed Ducts or Plenum:
a. Install insulation to ducts or plenums furnished with butt joints, without voids and with adhesive over entire surface of duct. Cover insulation with canvas jacket, fastened tightly to insulation with lagging adhesive. Install 2 finish coats of undiluted adhesive.

b. When installing jacket, finished covering shall be even and level, without humps, with constant diameters on round ducts maintained.

c. For non-lined insulated ducts or plenums exposed to weather: Insulation finish shall be 0.016 inch thick aluminum sheet with joints lapped not less than 3 inches, sealed, and secured with 6 gage by 3/8 inches aluminum sheet metal screws, or aluminum handgun-type rivets.

B. Lining:

1. General:

   a. Floors of cold plenums and fan enclosure plenums shall not be insulated.

   b. Cover short damper sections on lined ducts on outside to permit free operation of dampers and linkage.

   c. Dimensions of ducts indicated are net inside dimensions and must include thickness of duct liners to obtain the required duct size.

   d. Install insulation in square turns, where required, to cover interior surfaces before duct turns are installed.

2. Interior insulation (lining) of ducts shall be as specified in above. Lining may only be furnished as one of following assemblies:

   a. Factory installed, integral with sheet metal outer duct and interior perforated or non-perforated sheet metal liner, non-metal components not exposed to air stream; United Sheet Metal, Type P-27 or K-27.

   b. Liner material installed during fabrication of duct with sealed face only exposed to air stream. Insulation shall be fastened to sheet metal with an approved fire-retardant adhesive, with minimum 90 percent coverage and edges firmly adhered. Mechanical fasteners shall supplement the adhesive on top sections of ducts more than 12 inches wide and on sides of ducts more than 24 inches high, and shall be spaced on 16-inch centers maximum. Fastener posts shall be cut off approximately 1/4 inch from metal disc.

3. Interior insulation in ducts or plenums shall not have exposed edges. Edges open to entering or leaving air streams shall be covered, secured in place and sealed with approved duct liner edge sealers.

3.7 CLEANUP

   A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.8 PROTECTION

   A. Protect the Work of this section until Substantial Completion.
SECTION 15180
HEATING AND AIR CONDITIONING PIPING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes: Providing complete piping systems for heating, ventilating, and air conditioning systems as indicated. Systems include but are not limited to the following:

2. Miscellaneous Piping Required for Equipment of this Section.

C. Related Sections:

1. Section 02318: Excavating, Backfilling and Compacting for Utilities.
2. Section 15010: Basic Mechanical Requirements.
3. Section 15050: Basic Mechanical Materials and Methods.
4. Section 15070: Mechanical Sound, Vibration and Seismic Control.
5. Section 15075: Mechanical Identification.
6. Section 15080: Mechanical Insulation.
7. Section 15400: Plumbing.
8. Section 15460: Water Treatment Equipment
10. Section 15900: HVAC Instrumentation and Controls.

1.2 QUALITY ASSURANCE

A. Refer to Sections 15050 and 15010.

1.3 SUBMITTALS

A. Provide submittals in accordance with Division 01 and Section 15010.

B. Manufacturer’s Data: Comply with requirements of Section 15050.

1.4 PRODUCT HANDLING

A. Comply with requirements of Section 15050.
1.05 COORDINATION

A. Coordinate related and adjacent activities in accordance with Section 01100.

PART 2 - PRODUCTS

2.1 MATERIALS, EQUIPMENT AND METHODS

A. Heating Hot Water (Above Grade Piping):

1. Pipe:
   a. 2 inches and smaller: Standard weight, seamless copper, type L hard drawn, ASTM B 88.
   b. 2-1/2 inches and larger: Schedule 40 seamless black steel, ASTM A 53B, Type S. Pipes and fittings shall be properly marked with Schedule No. ASTM No. Manufacturer, Etc in accordance with ASTM requirements.

2. Fittings:
   a. 2 inches and smaller: Wrought solder-type copper, in accordance with ANSI B 16.22.
   b. 2-1/2 inches and larger: Schedule 40 seamless black steel, ASTM A 53B, Type S. Pipes and fittings shall be properly marked with Schedule No. ASTM No. Manufacturer, Etc in accordance with ASTM requirements.

3. Joints:
   a. 2 inches and smaller: 95 percent tin and 5 percent antimony solder with non-acid flux type flux, ASTM B32, grade 95TA.
   b. 2-1/2 inches and larger: Schedule 40 seamless black steel, ASTM A 53B, Type S. Pipes and fittings shall be properly marked with Schedule No. ASTM No. Manufacturer, Etc in accordance with ASTM requirements.

4. Unions:
   a. 2 inches and smaller Wrought solder type, copper to copper; except furnish dielectric unions where copper connects to steel.
   b. 2-1/2 inches and larger: Same as low-pressure steam.

B. Electric Motor Operated Valves: Electric motor operated valves shall have operating motors completely immersed in oil.

C. Valves, General:

1. Handles or hand wheels on valves shall be removable and, unless specified to be of loose key type, shall be securely fastened to their stems. Valve handwheels, except those on radiator valves, shall be of steel, brass, or cast iron.

2. Boiler shut-off valves and valves on steam mains installed more than 6 feet above floor, shall be furnished with chain wheels and chains to within 6 feet of floor. Chains shall be free hanging and in a position to permit operation of valve from floor. When pulleys or extensions are required to locate these chains in such a
position, furnish, and install said pulleys or extensions as required to provide a satisfactory operating installation. Extensions over one foot long shall be furnished with a supported outboard bearing.

3. Furnish and install chains or wire rope with required accessories to open safety valves from boiler room floor.

4. Radiator or convector valves shall be corner or angle type with composition handles, composition renewable discs, packing gland, union nut on tailpiece, unless otherwise specified. If exposed, they shall have a finished or plated exterior.

5. Temperature Control Valves: Refer to Section 15050.

6. Flow Control Valves: Refer to Section 15050.

D. Flow Measuring Devices: Refer to Section 15050.

E. Strainers: Refer to Section 15050.

F. Condensate Drain Piping, from Air Handling Units:
   1. Pipe: Type M tempered copper tube.
   2. Fittings: Wrought copper. Refer to Section 15050. Furnish copper to threaded international pipe size adapters at threaded connections.
   3. Joints:
      b. Threaded: Pipe joint compound equivalent to WKM Key-Tite.

G. Indirect Drains, Relief Valve Discharge Piping and Air Vent Discharge Piping:
   1. Pipe: Type M tempered copper water tube.
   2. Fittings: Wrought copper. Refer to Section 15050. Furnish copper to threaded international pipe size adapters at threaded connections.
   3. Joints:
      b. Threaded: Pipe joint compound WKM Key-Tite, or equal.

H. Insulation: Refer to Section 15080.

I. Pipe Anchors, Pipe Guides, Expansion and Contraction Devices:
   1. Piping subject to expansion or contraction shall be fastened in a manner permitting strains to be evenly distributed and alleviated by swing joints or expansion loops or joints. Seismic restraints shall be installed so as not to interfere with expansion and contraction of piping.
   2. Provide anchors in heating or cooling piping system, to restrain and control direction of movement for expansion or contraction in piping system.
3. Provide guides at specific locations in heating or cooling piping system in conjunction with slip or bellows type expansion joint.

4. When coils or unit housings are shock or vibration isolated, provide piping flexible metal connector not less than 10 inches long whether they are indicated on the Drawings or not.

J. Flexible Metal Connectors:

1. Provide vibration elimination flexible metal connectors on chilled and hot water supply and return piping where rigidly supported pipes connects to unit housing coil attachments and units are supported by vibration isolators.

2. Schedule Numbers:
   a. FMC-1: Corrugated bronze metal hose with outer bronze braid in tubular sheath of woven metal wires. Connector with female copper tube ends for copper piping. Metraflex model BBS, or equal.
   b. FMC-2: Corrugated stainless steel metal hose with outer stainless steel braid in tubular sheath of woven metal wires. Connector with male pipe threads (NPT) for threaded piping. Metraflex model SST, or equal.
   c. FMC-3: Corrugated Bronze Metal Hose with outer bronze braid in tubular sheath of woven metal wires. Connector with female copper tubes ends for refrigeration piping. Metraflex model RAF, or equal.

K. Refer to Sections 15050 or 15400, as applicable, for following:

1. Pipe Hangers and Supports.
2. Pipe Sleeves and Plates.
3. Pipe Flashings.
4. Relief Valves.
5. Thermometers.
6. Pressure Gages.
7. Pressure and Temperature Test Plugs.
10. Expansion/Compression Tanks.
11. Condensate Traps.
PART 3 - EXECUTION

3.1 PIPING INSTALLATION
   A. Install piping systems for refrigerant piping, condensate drains, and miscellaneous piping required for equipment, as indicated on Drawings and as specified in Section 15050.

3.2 CLEANUP
   A. Remove rubbish, debris and waste material and legally dispose of off the Project site.

3.3 PROTECTION
   A. Protect the Work of this section until Substantial Completion.

END OF SECTION
SECTION 15400

PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes: Labor, materials, tools, and equipment to install plumbing systems as indicated.

C. Related Sections:
   2. Section 07920: Joint Sealants
   3. Section 15010: Basic Mechanical Requirements.
   4. Section 15050: Basic Mechanical Materials and Methods.
   5. Section 15070: Mechanical Sound, Vibration and Seismic Control.
   7. Section 15700: Heating, Ventilating and Air Conditioning Equipment.

1.2 SUBMITTALS

A. Provide in accordance with Division 01 and Section 15010: Basic Mechanical Requirements.

1.3 QUALITY ASSURANCE

A. Unless otherwise noted, provisions including amendments thereto, of the State Plumbing Code Part 5, Title 24, CCR; of the Uniform Plumbing Code, latest edition; and of the latest Plumbing Ordinances of the City and County of Los Angeles are hereby made part of this section.

B. Conform to provisions of Section 15010: Basic Mechanical Requirements.

C. Manufacturer of plumbing products must have ANSI/NSF Standard 61, Section 9 certification to demonstrate compliance with the federal requirements for lead contribution to drinking water (Safe Drinking Water Act SDWA).

1.4 PRODUCT HANDLING

A. Conform to provisions of Section 15050: Basic Mechanical Materials and Methods.

PART 2 - PRODUCTS

2.1 PIPING SYSTEMS

A. Materials: Refer to Section 15050: Basic Mechanical Materials and Methods.

B. Insulation for Piping: Refer to Section 15080: Mechanical Insulation
2.2 FIXTURES AND DRAINS

A. General: Fixtures specified shall be furnished complete with trim and fittings. Cast iron plumbing fixtures shall be acid resistant enamel, and identified by casting letters "AR" or words "acid-resistant" into metal. Fixtures shall be white unless otherwise specified. Cast iron fixtures shall be white enamel inside and on back, rim and apron, with exposed unfinished surfaces painted white. Fixtures of same general classifications shall be of same make.

B. Finished Brass:

1. Unless otherwise specified, finished brass of a similar type shall be of same manufacturer and model throughout buildings.

2.Finished and exposed brass equipment, except floor, shower and urinal drains shall be chromium-plated and polished. Floor, shower and urinal drains, unless otherwise specified, shall be nickel-bronze metal.

C. Traps, Trap Arms and Tailpieces:

1. Fixture traps shall be all cast brass, chromium-plated and polished. Exceptions as follows:
   a. Traps that are an integral part of a fixture.
   b. Traps concealed in floors, walls and furring.

2. Concealed traps and 17 gauge tailpieces may be rough brass finish, except as otherwise specified. Laboratory traps and tailpieces shall be as specified in Section 15050: Basic Mechanical Materials and Methods. Furnish chromium-plated and polished cast brass wall flanges with setscrews and chromium-plated and polished brass casing on discharge side of each trap.

3. Tailpieces shall be not lighter than 17 gauge, brass, chromium-plated, and polished. Furnish and install chromium brass plated wall flanges with set screws and chromium-plated 20 gauge brass casing on discharge side of each chrome-plated all cast trap.

2.3 CLEANOUT ASSEMBLIES

A. Cleanout plug shall be line size.

B. Schedule Numbers:

CO-1: Iron body cleanout tee full line size up to 4 inches and round access plate, plugs shall be brass, countersunk with tapped boss for 5/16 inch No. 18 or 1/4 inch No. 20 screws. AB&I and TYLER may be used as iron body cleanouts. Trim and accessories shall be Smith or Zurn or equal.

<table>
<thead>
<tr>
<th>SMITH</th>
<th>ZURN</th>
<th>AB&amp;I</th>
<th>TYLER</th>
<th>WATTS</th>
<th>MIFAB</th>
</tr>
</thead>
<tbody>
<tr>
<td>4532-U</td>
<td>Z-1446-BP</td>
<td></td>
<td></td>
<td>CO-460-RD-34B</td>
<td>C1460-RD-6</td>
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</tbody>
</table>

CO-2: Iron body with approved UPC plug, top and adjustable sleeve, cut-off ferrule, polished scoriated brass nickel bronze secured cover. AB&I and TYLER may be used as iron body cleanouts. Trim and accessories shall be Smith or Zurn or equal.
Square:

<table>
<thead>
<tr>
<th>AB&amp;I</th>
<th>SMITH</th>
<th>ZURN</th>
<th>WATTS</th>
<th>MIFAB</th>
</tr>
</thead>
<tbody>
<tr>
<td>4053L-U-NB</td>
<td>ZN-1400-T</td>
<td>CO-200-S</td>
<td>C1220-S-1-6</td>
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</tbody>
</table>

Round:

<table>
<thead>
<tr>
<th>SMITH</th>
<th>ZURN</th>
<th>WATTS</th>
<th>MIFAB</th>
</tr>
</thead>
<tbody>
<tr>
<td>4033-L-U-NB</td>
<td>ZN-1400</td>
<td>CO-200-R</td>
<td>C1220-1-6</td>
</tr>
</tbody>
</table>

CO-3: Secured cover, extra heavy-duty, adjustable sleeve, cut-off ferule, UPC. Brass approved type plug, scoriated tractor type cover.

<table>
<thead>
<tr>
<th>SMITH</th>
<th>ZURN</th>
<th>WATTS</th>
<th>MIFAB</th>
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</thead>
<tbody>
<tr>
<td>4233-U</td>
<td>ZN-1400-HD</td>
<td>CO-200-RX-4</td>
<td>C1220-4-6</td>
</tr>
</tbody>
</table>

2.4 DIELECTRIC UNIONS

A. Schedule Numbers:

1. Dielectric style Unions using ferrous and no-ferrous metals are prohibited. Dielectric flanges are admitted for use – see DU-2.

DU-1: Brass union with 6-inch brass nipple.

DU-2: Brass union or Brass flanged fittings are to be used in between pipes made of dissimilar metals to prevent accelerated corrosion and deterioration in the piping systems due to galvanic and stray current.

<table>
<thead>
<tr>
<th>WATTS</th>
<th>OR EQUAL</th>
</tr>
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<tbody>
<tr>
<td>3100-CXC,</td>
<td></td>
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</table>

2.5 FLEXIBLE HOSES

A. Schedule Numbers:

FLH-1: Braided stainless steel metal hose (for gas use). US Flex, Metraflex or equal.

FLH-2: Braided bronze metal hose (for non pressure condensate connection use). US Flex, Metraflex or equal.

2.6 FLOOR SINKS

A. Schedule Numbers:

FS-1: 6 inches to 8 inches deep, square cast iron acid-resistant enamel, bottom aluminum dome strainer with nickel bronze rim and grate top.

<table>
<thead>
<tr>
<th>SMITH</th>
<th>ZURN</th>
<th>WATTS</th>
<th>MIFAB</th>
</tr>
</thead>
<tbody>
<tr>
<td>3140Y 3150Y</td>
<td>Z-1901 ZN-1900</td>
<td>FS-740-1 or FS-730-1</td>
<td>FS1720-1, FS1730-1</td>
</tr>
</tbody>
</table>
2.7 SERVICE STOP GAS VALVES

A. Gas valve to be used as follows:

Bronze/Brass gas cock valve with double stake packing nut, ½" to 2", with IPS, inclusive, with flat or square head. CSA approved.

<table>
<thead>
<tr>
<th>AMERICAN</th>
<th>Mc DONALD</th>
</tr>
</thead>
<tbody>
<tr>
<td>85 CBK or 86C</td>
<td>10596, flat 10604, square</td>
</tr>
</tbody>
</table>

Bronze/Brass, ¾" to 2" IPS (WOG) water, oil, or gas – full port ball valve. CSA approved.

<table>
<thead>
<tr>
<th>WATTS</th>
<th>NIBCO</th>
<th>WILKINS</th>
</tr>
</thead>
<tbody>
<tr>
<td>g4000-FDA</td>
<td>F-510-CS-R-66-FS</td>
<td>Model 850</td>
</tr>
</tbody>
</table>

Lubricated plug gas valve, 3/4" to 2" IPS valve.

<table>
<thead>
<tr>
<th>NORDSTROM</th>
<th>WALWORTH</th>
<th>RESUN</th>
</tr>
</thead>
<tbody>
<tr>
<td>142</td>
<td>1786</td>
<td>1430</td>
</tr>
</tbody>
</table>

Bronze/Brass ½" to 2" IPS X Flare Appliance ball valves with Tee handle. Flares to be used in conjunction with corrugated flex lines.

<table>
<thead>
<tr>
<th>RED and WHITE</th>
<th>BRASSCRAFT</th>
<th>NIBCO</th>
</tr>
</thead>
<tbody>
<tr>
<td>RW 5210</td>
<td>TBV 10-12</td>
<td>GBV 12</td>
</tr>
<tr>
<td>RW 5211</td>
<td>TBV 8-8</td>
<td>GBV 1516</td>
</tr>
<tr>
<td>RW 5221</td>
<td>TBV 6-8</td>
<td>GBV 1516</td>
</tr>
</tbody>
</table>

2.8 TRAP PRIMERS

A. Schedule Numbers:

ATP-1: Automatic, trap primer, cast bronze with access panel. Manufactured by PPP, Smith, Josam, or equal. (Installed in accessible location.)

<table>
<thead>
<tr>
<th>SMITH</th>
<th>PPP</th>
<th>ZURN</th>
<th>WATTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2699</td>
<td>P2-500</td>
<td>Z-1022</td>
<td>A-200</td>
</tr>
</tbody>
</table>

ATP-2: Automatic, Multi-trap primer, cast bronze with access panel. Manufactured by:

<table>
<thead>
<tr>
<th>PPP</th>
<th>Or Approved Equal</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2-500 with DU4</td>
<td></td>
</tr>
</tbody>
</table>

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which Work of this section will be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.
3.2 INSTALLATION

A. General:

1. Unless otherwise specified, plumbing fixtures, equipment and appliances that require connections to plumbing line shall be connected. This shall include fixtures specified or indicated as furnished by others, furnished by Owner, or specified in other related sections. Install supplies, stops, valves, traps, wall flanges, or pipe casing for connection of this equipment.

2. Install equipment as indicated on reviewed and accepted Shop Drawings.

3. Avoid interference with Work of other trades. Do not deviate from Drawings without review of the Architect.

B. Examination: Check each piece of equipment in system for defects verifying that parts are properly furnished and installed.

C. For piping Work, refer to Section 15050: Basic Mechanical Materials and Methods.

D. Plumbing Fixture and Equipment Installation:

1. Rough-in for fixtures, equipment and appliances shall be as indicated on Drawings and as specified, including those items indicated as furnished by others, furnished by Owner, or future capacity. When connections to equipment from capped or plugged lines are required, caps or plugs shall be removed at time equipment is set and stops or valves installed and connections provided as specified.

2. Piping materials for trap arms shall be Brass, Cast Iron or DWV copper

3. Piping shall be stubbed out to exact location of fixtures and stubs shall be installed symmetrical with fixtures. Hot and cold water supplies for center set faucets on lavatories shall be installed on 8-inch centers, unless otherwise specified or required.

E. Cleanouts in Drain, Waste, Vent and Sewer Lines:

1. Cleanouts shall be installed at locations stated in the California Plumbing Code and accessible at following locations:

   a. At locations above first floor as stated on construction documents.

   b. Install an accessible main line upper terminal cleanout in all restrooms above water closet over flow. (Install above upper terminal water closet where there are more than one water closet in a restroom).

   c. Above service sink with brass plug.

   d. In vertical line at base of each downspout connected to an underground storm drain system extend cleanout to exterior of building.

   e. At upper end of a horizontal vent line when any part of horizontal line is below overflow level of fixture it serves.

   f. Not to exceed 100-foot intervals in sewer and waste lines exterior of building.

   g. Where indicated on Drawings.
2. Cleanouts shall be extended to grade as follows:
   a. Not to exceed 100-foot intervals in straight runs of pipe outside buildings.
   b. At changes of direction greater than 22-1/2 degrees (underground).
   c. Where cleanouts occur under concrete.
   d. Where marked for future connections.

3. Cleanouts in building shall be extended to floor level or above floor level or above floor level in walls or furring when cleanouts are not accessible or where clearance is less than 18 inches.

4. Cleanouts in finished areas in building shall be concealed except that cleanouts above service sinks in janitor's rooms or closet, and cleanouts above service sinks or in exposed piping in boiler or heater equipment rooms, may be exposed. Cleanouts for urinals shall be installed above urinal and shall terminate behind an access plate.

5. Cleanouts in floors of covered areas and those extended to grade in concrete areas shall be floor level type with extensions body brass plugs and detachable nickel-bronze or aluminum alloy scoriated.

6. Concealed cleanouts in vertical lines shall be service weight soil cleanout tees with brass plugs and round cover plates unless otherwise specified or indicated. A snug fitting sleeve of galvanized sheet metal shall be placed around hub of tee and shall extend to flush with finished soil, or cleanout shall be extended to finished wall.

7. Cleanouts extended from below floor to a wall or furring or on horizontal lines above floor that terminate at a wall or furring shall be iron body type with brass plugs and round cover plates.

8. Cover plates over cleanouts in painted walls shall be steel, bonderized and prime coated. Cover plates cover cleanouts in tile walls shall be chromium-plated brass or nickel bronze. Plates shall be attached to cleanout plugs with 5/16 inch No. 18 or 1/4 inch No. 20 stainless steel vandal-proof type screws. Plates shall be one inch larger in diameter than fitting opening.

9. All other cleanouts shall be iron body type.

10. Cleanout extensions shall be no-hub cast iron soil pipe. Exterior cleanouts, those in concrete excepted, shall terminate in a 14 inch x 6 inch thick concrete block with cleanout assembly and top of block flush with finish grade.

11. Fittings in lines utilized as cleanouts shall be approved soil fittings including no-hub pipe. Tees and crosses in vent headers excepted.

12. Pipe joint compound shall not be installed on cleanout plug. After lines are tested and approved, each cleanout plug shall be removed, greased, and replaced.

3.3 EXCAVATION, TRENCHING AND BACKFILLING

A. Perform trenching, excavation, and backfilling required for Work of this section as specified herein and in Section 02318: Excavating, Backfilling, and Compacting for Utilities.
3.4 SERVICE CONNECTIONS

A. Determine exact location of required water, drain, and sewer connections and provide proper connections.

B. Potable water lines shall be purged completely before connecting to sources of water for the Project. Determine quality of water supply before connection.

3.5 CONDENSATE DRAINS - FROM AIR CONDITIONING UNITS

A. Connect drain piping from drain pan of air conditioning unit to condensate disposal location indicated. When coil or unit housing is shock or vibration isolated, connection shall be furnished through a flexible connector not less than 10 inches long. Drain line shall pitch to flow out at not less than one inch in 8 feet. Drain line size shall be per UPC (3/4 inch up to 3 ton only). Drain line shall not be reduced smaller than unit outlet connection.

B. Condensate drain piping installed within building whether in air conditioned space or not shall be insulated. Refer to Section 15080: Mechanical Insulation, for type of material required.

C. Condensate Trap:

1. A condensate trap shall be installed for each air conditioning coil. Trap shall be assembled from 2 brass unions: one between A/C unit and inlet of trap, and one at outlet of trap that connects to main drain.

2. Trap configuration shall be per manufacturer’s recommendations based on total unit casting static pressure (simulated plugged filter condition), but not less than 3 inch water seal.

3. Running trap design is not permitted.

4. Secondary drain shall not be trapped.

D. Condensate trap shall be checked at equipment operational tests for proper water drainage flow from air conditioning unit. Cooling condensate pan shall be filled with water, filters covered with plastic (plugged filter simulated), unit panels replaced, and unit motor running at design condition. Pan shall drain without hesitation to bottom of inlet connection. Tests are made prior to installation of ceiling.

E. Secondary Overflow Drain:

1. Drain pan installed underneath air conditioning units in concealed ceiling space or units that incorporate dam fitting shall be furnished with secondary drain piped to outside planter area with outflow location clearly visible.

2. If outside building location is not available or feasible, secondary drains will be piped to a classroom sink, if sink is not available pipe to a room corner away from cabinets, computers, desks, door ways/entrances or stairs.

3. Secondary vertical pipe that penetrates through suspended ceiling shall be furnished with a coupling or threaded adapter so ceiling tile can be removed without damage.

3.6 GAS SERVICE

A. Above Grade Service: Pipe shall be steel, hammerered, free of dirt and scale, and blown
out with oil-free air or nitrogen to a clean, dry condition. Piping shall not be installed in or through a ventilation duct or plenum.

B. Underground Service, Gas approved (yellow) Polyethylene Plastic Pipe:
Refer to Section 15050: "Basic Mechanical Materials and Methods".

1. Pipes shall be joined with polyethylene fitting and joined together by thermal fusion in accordance with procedures recommended by Polyethylene plastic pipe and fitting manufacturer.

2. Plastic pipe shall be installed not less than 30 inches below grade.

3. Underground Warning Tape shall be installed 12" above buried gas piping. Warning tape shall be yellow with caution statement as follows: "CAUTION - BURIED GAS LINE BELOW".

4. Plastic pipe shall not be installed in or under a building or structure. Pipe shall be installed under bituminous surfacing or compacted soil area, free from large stones. Pipe may be installed under sidewalks or driveways, as long as no joint occurs. Pipe installed under paved covered areas wider than 40 feet shall be installed in ventilated conduits extending 2 feet past paving.

5. Pipe shall be installed on a 6 inches deep sand bed. After required pressure-leak test, pipe shall be covered with sand not less than 6 inches thick.

6. Piping shall not support weight of valves, metal fittings or other items. Pipe shall be installed strain free.

7. Plastic pipe fittings shall not be stored or left exposed to sunlight. Pipe in open trenches shall be shielded. A sand envelope of 6" minimum shall be placed around pipe, with exception of joints, until inspection by IOR is completed. Protection for pipe shall be provided when necessary to leave pipe exposed overnight.

8. Installer of piping is required to have training and to have attained a certification. Non-trained/Non-certified installer must contact the manufacturer or manufacturer's representative to provide on-site fusion training and certification, prior to work commencement.

9. Polyethylene plastic pipe shall connect to a steel epoxy coated anodeless type riser to minimum of 6" above grade, when exiting the underground installation and transitioning to steel pipe connection.

10. Where s steel pipe rise passes into a structure or building, a double swing or double-offset joint shall be furnished. Pipe shall pass into structure 6" above grade and through a sleeve with a minimum one inch clearance. An isolation valve is required before pipe entering the building.

3.7 CLEANING - PLUMBING PIPING SYSTEMS AND FIXTURES

A. Plumbing lines and fixtures shall be flushed to remove dirt and foreign material until water runs clear and no foreign substance or odor is present. Strainers and screens on faucets shall be removed during this cleaning operation.

B. After satisfactory cleaning of strainer and screen replacements has been witnessed by IOR, post and maintain signs stating: "CAUTION - Water at this construction Project has not yet been certified for human consumption." Signs shall be furnished with letters at least 1/2 inch in height, and shall be conspicuously posted at entrances to Project site.
Signs shall be paneled, black and yellow, in conformance with OSHA Section 1910.1455.

3.8 DISINFECTING DOMESTIC WATER PIPING SYSTEMS

A. Newly installed or replaced piping and/or fixtures dispensing potable water shall be disinfected and undergo an approved bacteriological analyses before water system is allowed for public use.

B. All work shall be performed by Technicians Certified by the American Water Works Association (AWWA) and/or the State of California Department Health Services, Grade II Water Treatment Operator Certification or higher issued by the Department of Health Services (DHS) for the State of California. Comply with Title 22, Code of Regulations Division 4, Chapter 13, Article 2 Operator Certification Grades.

C. Method:
   1. A Reduced Pressure Backflow assembly shall be in installed to protect from cross contamination of the local water purveyor's meter service supply when at any time there is any type of water connection with the piping to be disinfected (Chlorinated) and the water meter service supply.
   2. System is to be flushed to remove any materials that may have entered the system.
   3. Using a chemical feed metering pump and a chlorine tank, the chlorine solution is injected into the water system.

D. Disinfection and De-chlorination procedure (24 or 3 Hour Contact Time):
   1. 24 Hour Test Method:
      a. Prior to disinfection, post signs on all water outlets of the system to be disinfected. Sign or tags shall read, "Water System Being Chlorinated-"Danger Do Not Drink Water" or similar warning.
      b. Piping system shall then be adequately flushed with water to remove any particles and eliminate air pockets.
      c. Using the continuous feed method, sodium hypochlorite conforming to ANSI/ AWWA B300 will be injected into the water system at a minimum of 50 PPM. A water flow meter provided by the water treatment technician will be used to determine the rate of injection and a chlorine test kit, Hach or equivalent, will be used to monitor the residual.
      d. Chlorine residual test will be taken at all appropriate points and outlets to verify 50 PPM residual levels.
      e. The chlorinated system shall be shut down for any use and the chlorinated water shall remain in the water system for retention of 24 hours.
      f. After 24 hours, chlorine residual levels will again be tested at various points throughout the system to insure a minimum of 25 PPM residual. If the system has not met the minimum of a 25 PPM residual, the above disinfection process shall be repeated.
      g. After satisfactory completion of the residual testing, flush out system until Hach or equivalent test reveal the water outlets have a free chlorine
residual concentration less than 0.5 PPM. The procedure shall be in accordance with the AWWA standard C651-05.

h. The OAR may allow temporary use of the water system for construction purposes pending results of the bacteriological test analysis. Sign or Tags shall be left on all outlets stating water system is not safe for consumption until laboratory results are complete and meet these specifications.

2. 3 Hour Test Method:

a. If the water systems must be turned on for use as soon as possible, a 3 hours chlorine contact time to allow for disinfection is permitted with the OAR's approval.

b. Prior to disinfection, post signs on all water outlets of the system to be disinfected. Sign or tags shall read, "Water System Being Chlorinated- "Danger Do Not Drink Water" or similar warning.

c. Piping system shall be then adequately flushed with water to remove any particles and eliminate air pockets. Using the continuous feed method, sodium hypochlorite conforming to ANSI/ AWWA B300 will be injected into the water system at a minimum of 200 PPM. A water flow meter provided by the water treatment technician will be used to determine the rate of injection and a chlorine test kit, Hach or equivalent, will be used to monitor the residual.

d. Chlorine residual test will be taken at all appropriate points and outlets to verify 200 PPM levels. The chlorinated system shall be shut down for any use and the chlorinated water shall remain in the water system for retention of 3 hours.

e. After satisfactory completion of a 3 hour disinfection period, flush out system until Hach or equivalent test reveal the water outlets have a free chlorine residual concentration less than 0.5 PPM. The procedure shall be in accordance with the AWWA standard C651-05.

f. The OAR may allow temporary use of the water system for construction purposes pending results of the bacteriological test analysis. Sign or Tags shall be left on all outlets stating water system is not safe for consumption until laboratory results are complete and meet these specifications.

E. Bacteriological Test:

1. After final flushing and satisfactory results from the residual free chlorine concentration test, Bacteriological test samples shall be collected. The intent of the following is to provide insurance for an accurate representation to a complete Bacteriological test of the water system. At least two samples shall be taken from each floor of each building.

2. Bacteriological test samples shall be delivered to a State of California Department of Health Services Certified Laboratory to perform qualitative and quantitative bacterial analyses on the water samples for the presence of any Total Coliform bacteria and Plate Count. This count must be less than 500 cfu/mL.
3. The procedure shall be repeated if it shown by bacteriological examination made by an approved agency that the level of Disinfection does not meet these specifications.

4. After satisfactory results for the bacteriological test are provided to the OAR, warning Sign or Tags shall be removed.

3.9 VALVES ON PLUMBING SYSTEM

A. Furnish and install gates, ball, globes, angles, and check valves on plumbing Work at following locations whether indicated on drawings or not.

B. All cold valves shall be iron pipe size (IPS).

1. Sweat valves are prohibited.

2. Above the ground copper water system, 2" and larger may utilize Victaulic butterfly valves and fittings for their connections. A 2" or larger Victaulic valve may be in a wall if an adequately sized access panel is provided for maintenance or removal.

C. Valves shall be accessible and installed within an access panel approximately 3 feet above floor and no more than 7 feet above floor.

3.10 VALVES - GAS SERVICE

A. A gas readily accessible shut-off stop shall be installed on each gas line entering a building immediately prior to the point it enters the building. Unless otherwise specified or indicated, shut-off valves for lines entering a permanent structure, buildings or portable buildings, shall be installed in a vertical riser above grade.

1. Gas shut off valve for portable buildings – A dedicated Gas shut off valve shall be provided in a marked Yard Box, for each portable building to facilitate relocation/ removal of building without the need to shut off gas to entire school.

B. Gas Shut off valve within a building – A gas shut off valve with handles shall be accessible and serviceable within an access panel. Install valve minimum 3 feet above floor but less than 7 feet above floor.

C. In addition to locations specified, gas shut ff valve shall be installed at following locations:

1. Install a lubricated plug gas shut off valve on any line connected to gas main or header at master assembly.

2. Install a lubricated plug gas shut off valve before entering any building or structure.

3. Install a gas valve on each outlet, in addition to any gas stop furnished with equipment.

4. Service to laboratory gas cocks shall be furnished with a special precision check valve, located downstream from gas stop servicing room outlet at each laboratory cock. Unless otherwise specified, 1/8” bore shall be provided for each outlet cock.

5. Install a gas shut-off valve on each gas line serving 2 or more gas outlets in same room. Service stop shall be installed not more than 7 feet above floor, and shall be in the room it serves.
6. Install a gas shut-off valve on inlet side of each gas pressure regulating valve.

7. Gas shut-off valves to be furnished with equipment.

8. Install gas shut-off valve at not more than 1,000 foot intervals on each gas main.

9. At multi-story buildings, provide gas-shut off valve(s) to isolate and control each floor/level. Install valve(s) in a concealed manner in walls with access panel(s).

10. Gas shut-off valves in classrooms and locations subject to tampering shall be protected while remaining accessible.

D. When a gas-shut off valve adjacent to gas-fired equipment is indicated in Contract Documents it shall be furnished and installed as part of Work of this section.

E. When electrical wall switches with emergency push button are specified for controlling gas outlets at Laboratory Classrooms, provide main shut-off gas valve with normally closed electric solenoid valve within an accessible access panel.

3.11 ELECTROLYSIS PREVENTION

A. Brass nipples, 6 inches, with recognized brass unions; flanges shall be furnished and installed at locations described herein. Flanges shall be installed with complete insulating component consisting of gasket bolt sleeves and bolt washers. Dielectric insulators shall be installed at following locations:

1. Where special applications indicated on Drawings require an insulation flange or brass union, with 6-inch brass nipple to be installed in a condensate line, or steam line, flange insulation shall be of a high temperature type, suitable for continuous operation at temperatures up to 220 degrees F. for condensate and 400 degrees F. for steam.

2. Where steel or cast iron in ground connects to copper or brass piping above ground, transition from steel or cast iron pipe to copper or brass pipe shall be provided in an accessible location.

3. Underground dielectric connections shall be furnished in accessible yard boxes.

4. Above ground dielectric connections shall be exposed; or if in finished rooms shall be located in accessible access boxes.

3.12 UNDERGROUND PIPE MARKERS

A. Pipe markers shall be furnished according to: Section 15075: "Mechanical Identification" – 2.06, A and B.

B. Under ground Caution Tape shall be placed 12" to 18" above the utility line. The Caution Tape shall be a designated color and marked with the appropriate name for the specific type of utility pipe as follows:

1. Yellow – with the words: CAUTION GAS LINE BELOW

2. Blue – with the words: CAUTION WATER LINE BELOW

3.13 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose off Project site.
3.14 PROTECTION

A. Protect Work of this section until Substantial Completion.

END OF SECTION
SECTION 15411

DOMESTIC WATER SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This section includes potable cold water, hot water, and circulation hot water piping, fittings, and specialties within the building to a point 5 feet outside the building.

1.2 RELATED SECTIONS

A. The following sections contain requirements that relate to this section:
   1. Division 2 – Site Work
   2. Division 7 - Joint Sealers. For materials and methods for sealing pipe penetrations through basement walls and fire and smoke barriers.
   3. Division 15 – Valves.
   4. Division 15 – Meters and Gauges. For thermometers and pressure gauges.
   5. Division 15 - Mechanical Identification. For labeling and identification of piping systems.
   6. Division 15 – Plumbing Equipment. For pressure booster systems, circulators, circulations pumps, motors and accessories.
   7. Separate sections of Division 15 specify Basic Piping Materials and Methods, Hangers and Supports, Expansion Compensation, piping system identification materials and requirements, general duty valves, pipe insulation, fire protection piping, and plumbing equipment.

1.3 DEFINITIONS

A. Water distribution pipe: A pipe within the building or on the premises that conveys water from the water service pipe or meter to the points of usage.

B. Water service pipe: The pipe from the water main or other source of potable water supply to the water distributing system of the building served.

C. Pipe sizes used in this specification are nominal pipe size (NPS).

1.4 SUBMITTALS

A. Submit the following in accordance with Conditions of Contract and Division 1 specification sections.
   1. Product data for each piping specialty and valve specified.
   2. Test reports specified in Part 3 of this section.
3. Maintenance data for each piping specialty and valve specified for inclusion in Maintenance Manual specified in Division 1 and Division 15 "Basic Mechanical Requirements".

1.5 QUALITY ASSURANCE

A. Regulatory requirements: Comply with the provisions of the following codes:

1. ASME B31.9 "Building Services Piping" for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label.

2. Comply with applicable portions of Codes and Regulations in use by authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Provide factory applied plastic end caps on each length of pipe and tube, except for concrete, corrugated metal, hub and spigot, clay pipe. Maintain end caps through shipping, storage and handling to prevent pipe end damage and prevent entrance of dirt, debris and moisture.

B. Protect stored pipes and tubes. Elevate above grade and enclose with durable, waterproof wrapping. When stored inside, do not exceed structural capacity of the floor.

C. Protect flanges, fittings and specialties, from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

D. Store pipe in a manner to prevent sagging and bending.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate the size and location of concrete equipment pads. Cast anchor bolt inserts into pad. Concrete, reinforcement, and formwork requirements are specified in Division 3.

B. Coordinate the installation of pipe sleeves for foundation and wall penetrations.

1.8 EXTRA MATERIALS

A. Maintenance stock: Furnish one valve key for each key operated wall hydrant, hose bibb, fixture supply, or faucet installed.

1.9 ABBREVIATIONS

| CW | Cold water |
| HW | Hot water |

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer Uniformity: Conform to the requirements specified in Division 15 "Basic Mechanical Requirements".

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Mechanical couplings and fittings for grooved end steel pipe:
2. Mechanical couplings and fittings for grooved end copper tube:
   a. Victaulic Co of America

3. Mechanical sleeve seals:
   a. Thunderline Corp.

4. Pipe escutcheons:
   c. Grinnell

5. Dielectric waterway fittings:
   a. Epco Sales, Inc.
   b. Victaulic Company of America

6. Dielectric unions:
   a. Eclipse, Inc.
   b. Perfection Corp.
   c. Watts Regulator Co.

2.2 PIPE AND FITTING MATERIALS

A. General: Materials shall be new domestic manufactured materials of standard manufacture suitable for required use. Street ells, bushings, and close nipples are not permitted. Pipe fittings shall be mill coated and show no rust marks or signs of corrosion.

B. Reference specifications: Pipe, valves and fittings conform to latest editions of specified standard specifications.

C. Testing: Testing not required but manufacturer shall certify that materials conform to reference specifications or specification.

2.3 PIPE (All piping shall be rated for the pressure of the systems)

<table>
<thead>
<tr>
<th>SERVICE</th>
<th>SIZE</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CW, HW (above ground)</td>
<td>6” and smaller</td>
<td>Copper tubing Type “L” ASTM B88</td>
</tr>
</tbody>
</table>

2.4 FITTINGS

A. Wrought copper solder joint fittings: ANSI B16.22, streamlined pattern.

B. Wrought copper and bronze grooved end fittings: ASTM B75 tube and ASTM B584 bronze castings.

C. Grooved end mechanical fittings: ASTM A47, ASTM A106, or A536, galvanized fittings with groves or shoulders designed to accept grooved end couplings.

D. Mechanical couplings for grooved end piping: Ductile or malleable iron housing, synthetic rubber gasket of a central cavity pressure responsive design, with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe or tube and fittings. Couplings for use with AWWA dimension piping shall conform to AWWA C606.
E. Unions: ASME B16.39, malleable iron, Class 150, hexagonal stock, with ball and socket joints, metal to metal bronze seating surfaces, female threaded ends. Threads shall conform to ASME B1.20.1.

F. Dielectric unions: Threaded, solder, or grooved end connections as required to suit application; constructed to isolate dissimilar metals, prevent galvanic action, and prevent corrosion.

G. Dielectric unions flexible connectors: Stainless steel bellows with woven, flexible, bronze wire reinforced protective jacket; minimum 150 psig working pressure, maximum 250 degrees F operating temperature. Connectors shall have flanged or threaded end connections to match equipment connected to and shall be 12 inches long and capable of 3/4 inch misalignment. Sweat ends are not acceptable.

2.5 JOINING MATERIALS

A. Solder filler metal: Lead free.

B. Bronzing filler metals: AWS A5.8, Bcup series.

C. Gasket material: Thickness, material, and type suitable for fluid to be handled and design temperatures and pressures.

2.6 GENERAL DUTY VALVES

A. General duty valves (i.e., gate, globe, check, ball, and butterfly) are specified in Division 15 "Valves". Special duty valves are specified below by their generic name; refer to Part 3 paragraph, "Valve Application" for specific uses and applications for each valve specified.

2.7 PIPING SPECIALTIES

A. Escutcheons: Chrome plated, stamped steel, hinged, split ring escutcheon, with setscrew. Inside diameter shall closely fit pipe outside diameter, or outside of pipe insulation.

B. Sleeves:

1. Sheet metal sleeves: 10 gage, galvanized sheet metal, round tube closed with welded longitudinal joint.

2. Steel sleeves: Schedule 40 galvanized welded steel pipe, ASTM A53, Grade A.

C. Mechanical sleeve seals: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine rough-in requirements for plumbing fixtures and other equipment with water connections to verify actual locations of piping connections prior to installation.

3.2 PREPARATION

A. Ream ends of pipes and tubes, and remove burrs. Bevel plain ends of steel pipe.
B. Remove scale, slag, dirt, and debris for both inside and outside of piping and fittings before assembly.

3.3 PIPE APPLICATIONS

A. Install Type L, drawn copper tube with wrought copper fittings and solder joints for pipe sizes 4 inch and smaller, above ground, within building.

3.4 PIPING INSTALLATION

A. General locations and arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layouts take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated.

B. Use fittings for all changes in direction and branch connections.

C. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted unless expressly indicated.

D. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.

E. Conceal all piping installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

F. Install piping tight to slabs, beams, joints, columns, walls, and other permanent elements of the building. Provide space to permit insulation applications, with 1 inch clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.

G. Install drains at low points in mains, risers, and branch lines consisting of a tee fitting, 3/4 inch ball valve, and short 3/4 inch threaded nipple and cap.

H. Pipe sleeves smaller than 6 inch shall be galvanized steel pipe.

I. Exterior wall penetrations: Seal pipe penetrations through exterior walls with sleeves and mechanical sleeve seals.

J. Fire barrier penetrations: Where pipes pass through fire rated walls, partitions, ceilings and floors, maintain the fire rated integrity. Refer to Division 7 for special sealers and materials.

3.5 HANGERS AND SUPPORTS

A. Hanger, support and anchor devices conforming to MSS SP-69 are specified in Division 15 "Hangers, Supports and Anchors".

3.6 PIPE AND TUBE JOINT CONSTRUCTION

A. Soldered joints: Comply with the procedures contained in the AWS "Soldering Manual".

1. CAUTION: Remove stems, seats, and packing of valves and accessible internal parts of piping specialties before soldering and brazing.
2. Fill the tubing and fittings during soldering and brazing with an inert gas (nitrogen or carbon dioxide) to prevent formation of scale.

3. Heat joints to proper and uniform temperature.

C. Threaded joints: Conform to ASME B1.20.1, tapered pipe threaded for field cut threads. Join pipe fittings and valves as follows:
   1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
   2. Align threads at point of assembly.
   3. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).
   4. Assembly joint wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.
   5. Damaged threads: Do not use pipe with corroded or damaged threads. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.

B. Flanged joints: align flanges parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.

C. Grooved end joints: Prepare pipe and tubing and install in accordance with manufacturer’s installation instructions.

3.7 SERVICE ENTRANCE
A. Extend water distribution piping to connect to water service piping, of size and in location indicated for service entrance to the building. Water service piping is specified in a separate section of Division 15.

B. For trenching and backfill, see Division 2.

C. Install sleeve and mechanical sleeve seal at penetrations through foundation wall for watertight installation.

D. Install shutoff valve at service entrance inside building, complete with strainer, pressure gage, and test tee with valve.

3.8 VALVE APPLICATIONS
A. General duty valve applications: The drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
   1. Shut off duty: Use ball valves.
   2. Throttling duty: use globe and ball valves.

3.9 INSTALLATION OF VALVES
A. Install sectional valves on each branch and riser, close to main, where branch or riser serves 2 or more plumbing fixtures or equipment connections, and elsewhere as indicated. For
sectional valves 2 inch and smaller, use ball valves; for sectional valves 2-1/2 inch and larger, use gate or butterfly valves.

B. Install shutoff valves on inlet of each plumbing equipment item, and elsewhere as indicated. For shutoff valves 2 inch and smaller, use ball valves; for shutoff valves 2-1/2 inch and larger, use gate or butterfly valves. For plumbing fixtures, see fixture trim.

C. Install drain valves on each plumbing equipment item, located to drain equipment completely for service or repair. Install drain valves at the base of each riser, at low points of horizontal runs, and elsewhere as required to drain distribution piping system completely. For drain valves 3/4 inch hose end drain valve.

D. Install swing check valves on discharge size of each pump and elsewhere as indicated.

E. Balance cocks: Install in each hot water recirculating loop, discharge size of each pump, and elsewhere as indicated.

3.10 EQUIPMENT CONNECTIONS

A. Piping run outs to fixtures: Provide hot and cold water piping run outs to fixtures of sizes indicated, but in no case smaller than required by plumbing code.

3.11 FIELD QUALITY CONTROL

A. Inspect water distribution piping as follows:

1. Do not enclose, cover, or put into operation water distribution piping system until it has been inspected and approved by the authority having jurisdiction.

2. During the progress of the installation, notify the plumbing official having jurisdiction at least 24 hour prior to the time such inspection must be made. Perform tests specified below in the presence of the plumbing official.

   a. Arrange for inspection of the piping system before concealed or closed in after system is roughed in and prior to setting fixtures.

   b. Arrange for a final inspection by the plumbing official to observe the tests specified below and to ensure compliance with the requirements of the plumbing code.

3. Whenever the plumbing official finds that the piping system will not pass the test or inspection, make the required corrections and arrange for re-inspection by the plumbing official.

4. Prepare inspection reports signed by the plumbing official.

B. Test water distribution piping as follows:

1. Test for leaks and defects all new water distribution piping systems and parts of existing systems that have been altered, extended or repaired. If testing is performed in segments, submit a separate report for each test, complete with a diagram of the portion of the system tested.

2. Leave uncovered and unconcealed all new, altered, extended, or replaced water distribution piping until it has been tested and approved. Expose all such work for testing that has been covered or concealed before it has been tested and approved.
3. Cap and subject the piping system to a static water pressure of 50 psig above the operating pressure without exceeding the pressure rating of the piping system materials. Isolate the test source to allow to stand for 4 hours. Leaks and loss in test pressure constitute defects that must be repaired.

4. Repair all leaks and defects with new materials and retest system or portion thereof until satisfactory results are obtained.

5. Prepare reports for all tests and required corrective action.

3.12 ADJUSTING AND CLEANING

A. Clean and disinfect water distribution piping as follows:

1. Purge all new water distribution piping systems that have been altered, extended, or repaired prior to use.

2. Use the purging and disinfecting procedure prescribed by the authority having jurisdiction or, in case that authority does not prescribe a method, the procedure described in either AWWA C651, or AWWA C652, or as described below:
   a. Flush the piping system with clean, potable water until dirty water does not appear at the points of outlet.
   b. Fill the system or part thereof with a water/chlorine solution containing at least 50 part per million of chlorine. Isolate (valve off) the system or part thereof and allow to stand for 24 hours.
   c. Drain the system or part thereof the previous solution and refill with a water/chlorine solution containing at least 200 parts per million of chlorine and isolate and allow to stand for 3 hours.
   d. Following the allowed standing time, flush the system with clean, potable water until chlorine does not remain in the water coming from the system.
   e. Submit water samples in sterile bottles to the authority having jurisdiction. Repeat the procedure if the biological examination made by the authority shows evidence of contamination.

B. Prepare reports for all purging and disinfecting activities.

3.13 COMMISSIONING

A. Fill the system. Check compression tanks to determine that they are not air bound and that the system is completely full of water.

B. Before operating the system, perform these steps:

1. Close drain valve, hydrants, and hose bibbs.
2. Open valves to full open position.
3. Remove and clean strainers.
5. Lubricate pump motors and bearings.

END OF SECTION
SECTION 15420

DRAINAGE AND VENT SYSTEMS

PART 1    GENERAL

1.1    SECTION INCLUDES

A. This section includes building sanitary and storm drainage and vent piping systems, including drains and drainage specialties.

1.2    RELATED SECTIONS

A. The following sections contain requirements that relate to this section:

1. Division 2 "Earthwork for Mechanical System", for trenching and backfilling materials and methods for underground piping installations.

2. Division 2 "Storm Sewage Systems" for storm water drainage piping beginning from 5'-0" outside the building.

3. Division 2 "Sanitary Sewage System" for sanitary drainage piping beginning from 5'-0" outside the building.

4. Division 15 "Mechanical Identification" for labeling and identification of drainage and vent piping.

1.3    DEFINITIONS

A. Building drain: The part of the lowest piping of a drainage system which receives the discharge from soil, waste and other drainage pipes inside the walls of the building and conveys it to the building sewer.

B. Building sewer: The part of the piping within a public or private premises which conveys sewage, rain water or other liquid wastes to a point of disposal.

C. Drainage system: Includes all piping within a public or private premises which conveys sewage, rain water or other liquid wastes to a point of disposal. It does not include the mains of public sewer systems or a private or public sewage treatment or disposal plant.

D. Vent system: A pipe or pipes installed to provide a flow of air to or from a drainage system, or to provide a circulation of air within such system to protect trap deals from siphonage and backpressure.

1.4    SUBMITTALS

A. Product data for the following products:

1. Drainage piping specialties.

2. Trench drains.

1.5    QUALITY ASSURANCE
A. Regulatory requirements: Comply with the provisions of the following:
   1. Uniform Plumbing Code (UPC).
   2. California Code of Regulations (CCR)
   3. OSHPD

1.6 SEQUENCING AND SCHEDULING
A. Coordinate the installation of roof drains, flashing and roof penetrations.
B. Coordinate flashing materials installation of roofing, waterproofing, and adjoining substrate work.
C. Coordinate the installation of drains in poured in place concrete slabs, to include proper drain elevations, installation of flashing, and slope of slab to drains.
D. Coordinate with installation of sanitary and storm sewer system as necessary to interface building drains with drainage piping system.

1.7 ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Sanitary sewer</td>
</tr>
<tr>
<td>W</td>
<td>Sanitary waste</td>
</tr>
<tr>
<td>V</td>
<td>Vent</td>
</tr>
<tr>
<td>CD</td>
<td>Condensate drain</td>
</tr>
<tr>
<td>D</td>
<td>Drain</td>
</tr>
</tbody>
</table>

PART 2 PRODUCTS

2.1 MANUFACTURERS
A. Subject to compliance with requirements, provide drainage and vent systems from one of the following:
   1. Drainage piping specialties, including, expansion joints, drains and trap primers.
      a. Ancon, Inc.
      d. Tyler Pipe
      e. Zurn Industries, Inc.

2.2 PIPING AND FITTINGS
A. General: Materials shall be new domestic manufactured materials of standard manufacture and suitable for required use.
B. Reference specifications: Pipe and fittings conform to latest editions of specified standard specification.
C. Above ground drainage and vent piping and fittings. Select from the following options, for S, W, V, SD
1. All pipe sizes: Cast iron soil pipe. Conform to ASTM A74, for service weight, hub and spigot soil pipe and fittings, with compression gasket joints conforming to ASTM C564.

2. All pipe sizes: Hubless cast iron soil pipe. Conform to CISPI Standard 301, service weight, cast iron soil pipe and fittings, with neoprene gaskets conforming to CISPI Standard 310.

3. Note: All sewer, storm drain, waste and vent piping located above ceiling in critical areas as noted in California Code of Regulations (CCR) Section 310 (h) and any other areas deemed critical by OSHPD, shall be provided with Factory Mutual approved number 1680 type couplings. Approved manufacturer: Husky series 4000 or Clamp All.

2.3 UNDERGROUND BUILDING DRAIN PIPE AND FITTINGS

A. Pipe and fittings shall have heavy coating of coal for varnish or asphaltum on both inside and outside surfaces.

B. For pipe and fittings below grade and/or below finish floor of floors on grade, select from the following options:

1. Pipe sizes 15 inch and smaller: Cast iron soil pipe. Conform to ASTM A74, for standard weight hub and spigot soil pipe and fittings, with clamps and neoprene gasket. Conform to ASTM C564.

2. Pipe sizes 16 inch and smaller: Hubless cast iron soil pipe. Conform to CISPI Standard 301, service weight, cast iron soil pipe and fittings, with neoprene gasket conforming to CISPI standard 310. Joint connections shall be "Best" or MG couplings.

2.4 DRAINS CD, D

A. ASTM B88 Copper tubing Type "L".

2.5 DRAINAGE PIPE SPECIALTIES

A. Trap primers: Bronze body valve with automatic vacuum breaker, with 1/2 inch connections matching piping system. Comply with ASSE 1018.

B. Expansion joints: Cast iron body with adjustable bronze sleeve, bronze bolts with wing nuts.

C. Cleanout plugs: Cast bronze of brass, threads complying with ANSI B2.1, countersunk head.

2.8 CLEANOUTS

A. Floor cleanouts to be adjustable type

1. Cleanouts on cast iron soil pipe; use iron body with brass plugs screwed into caulking ferrules.

2. Cleanouts on steel pipe, use brass plugs.

3. Where cleanouts occur in finished interior surfaces; use smooth polished chromium plated.

4. Exposed parts of floor cleanouts in finished rooms; use non-slip polished nickel bronze.

5. Where cleanouts occur in carpeted floor areas; the cover shall be elevated so as to be flush with finished carpeted areas.
B. Wall cleanouts: Cast iron body adaptable to pipe with cast bronze or brass cleanout plug, stainless steel cover including screws.
   1. Wall type for cast iron pipes: Smith 4532, Josam 58790-4, or Zurn Z-1445-1.
   2. Wall type for steel pipes: Smith 4472, Josam 58890-4, or Zurn 1460-8.

2.9 FLASHING
A. Flashing flanges: Cast iron watertight stack or wall sleeve with membrane flashing ring. Provide underdeck clamp and sleeve length as required.
B. Vent flashing sleeves: Cast iron caulking type roof coupling for cast iron stacks, cast iron threaded type roof coupling for steel stacks, and cast bronze stack flashing sleeve for copper tubing.

PART 3 EXECUTION

3.1 EXAMINATION
A. Verify all dimensions by field dimensions. Verify that all drainage and vent piping and specialties may be installed in accordance with pertinent codes and regulations, the original design, and the referenced standards.
B. Verify existing grades, inverts, utilities, obstacles, and topographical conditions prior to installations.
C. Examine rough-in requirements for plumbing fixtures and other equipment having drain connections to verify actual locations of piping connections prior to installation.
D. Examine walls, floors, roof, and plumbing chases for suitable conditions where piping and specialties are to be installed.
E. Do not proceed until satisfactory conditions have been corrected.

3.2 PIPE APPLICATIONS - ABOVE GROUND, WITHIN BUILDING
A. Select from the following options:
   1. Install hub and spigot, service weight, cast iron soil pipe with compression gasket joints for drainage and vent pipe.
   2. Install hubless, service weight, cast iron soil pipe and fittings for drainage and vent pipe.
   3. Install acid waste pipe and fittings at fixtures receiving acid waste.

3.3 PIPE APPLICATIONS WITHIN BUILDING
A. Install hub and spigot, service heavy weight, cast iron, soil pipe and fittings with gasketed joints for 15 inch and smaller drainage pipe.
B. Install hubless, service weight, cast iron, soil pipe and "Best" or MG couplings with neoprene gaskets.
3.4 PIPE AND TUBE JOINT CONSTRUCTION

A. Cast iron soil pipe: Make compression joints, and hubless joints in accordance with the recommendations in the CISPI Cast Iron Soil Pipe and Fittings Handbook, Chapter IV.

B. Install couplings per manufacturer's recommendations.

3.5 INSTALLATION

A. Drawings indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into account many design considerations. So far as practical, install piping as indicated.

B. Use fittings for all changes in direction and all branch connections.

C. Install exposed piping at right angles, or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.

D. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.

E. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below floors, unless indicated to be exposed to view.

F. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Allow sufficient space above removable ceiling panels to allow for panel removal.

G. Seal pipe penetrations through exterior walls using sleeves and mechanical sleeve seals. Pipe sleeves smaller than 6 inch shall be steel; pipe sleeves 6 inch and larger shall be sheet metal.

H. Fire barrier penetrations: Where pipes pass through fire rated walls, partitions, ceilings and floors, maintain the fire rated integrity.

I. Make changes in direction for drainage and vent piping using appropriate 45 degree wyes, half wyes, or long sweep quarter, sixth, eighth or sixteenth bends. Sanitary tees or short quarter bends may be used on vertical stacks of drainage lines where the change in direction of flow is from horizontal to vertical, except use long turn tees where two fixtures are installed back to back and have a common drain. Straight tees, elbows, and crosses may be used on vent lines. No change in direction of flow greater than 90 degree shall be made. Where different sizes of drainage pipes and fittings are connected, use proper size, standard increasers and reducers. Reduction of the size of drainage piping in the direction of flow is prohibited.

J. Install building drain pitched down at minimum slope of 1/4 inch per foot, (2%) for piping 3" and smaller, and 1/8 inch per foot (1%) for piping 4 inch and larger.

K. Install sleeve and mechanical sleeve through foundation wall for watertight installation.

3.6 HANGERS AND SUPPORTS

A. Hanger, supports and anchor devices are specified in Division 15 "Basic Mechanical Materials and Methods". Conform to the table below for maximum spacing of supports:
B. Install the following pipe attachments: Adjustable steel clevis hangers for individual horizontal runs less than 20' in length.

C. Install hangers at the following intervals:

<table>
<thead>
<tr>
<th>Pipe Material</th>
<th>Max. Horizontal Spacing in Feet</th>
<th>Max. Vertical Spacing in Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cast iron pipe</td>
<td>5</td>
<td>15</td>
</tr>
</tbody>
</table>

3.8 INSTALLATION OF PIPE SPECIALTIES

A. Install expansion joints on vertical risers as indicated, and as required by plumbing code.

B. Above ground cleanouts: Install in above ground piping and building drain piping as indicated and:

1. As required by plumbing code.
2. At each change in direction of piping greater than 45 degrees.
3. At minimum intervals of 50 feet for piping 4 inch and smaller and 100 feet for larger piping.
4. At base of each interval soil or waste stack.

C. Cleanout covers: Install floor and wall cleanout covers for concealed piping.

3.9 INSTALLATION OF TRAP PRIMERS

A. Install trap primers with piping pitched towards train trap, minimum of 1/8 inch per foot (1%). Adjust trap primer for proper flow.

3.10 CONNECTIONS

A. Piping run outs to fixtures: Provide drainage and vent piping run outs to plumbing fixtures and drains, with approved trap, of sized indicated; but in no case smaller than required by the plumbing code.

B. Locate piping run outs as close as possible to bottom of floor slab supporting fixtures or drains.

3.11 FIELD QUALITY CONTROL

A. Inspections:

1. Do not enclose, cover, or put into operation drainage and vent piping system until it has been inspected and approved by the authority having jurisdiction.

2. During the progress of the installation, notify the plumbing official having jurisdiction, at least 24 hours prior to the time such inspection must be made. Perform tests specified below in the presence of the plumbing official.

   a. Arrange for inspection of the piping system before concealed or closed-in after system is roughed in, and prior to setting fixtures.
b. Arrange of a final inspection by the plumbing official to observe the tests specified below and to insure compliance with the requirements of the plumbing code.

3. Whenever the piping system fails to pass the test for inspection, make the required corrections, and arrange for re-inspection by the plumbing official.

4. Prepare inspection reports, signed by the plumbing official.

B. Piping system test drainage and vent system in accordance with the procedures of the authority having jurisdiction, or in the absence of a published procedure, as follows:

1. Test for leaks and defects all new drainage and vent piping systems, which have been altered, extended or repaired. If testing is performed in segments, submit a separate report of each test, complete with a diagram of the portion of the system tested.

2. Leave uncovered and unconcealed all new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose all such work for testing, that has been covered or concealed before it has been tested and approved.

3. Rough plumbing test procedure: Except for outside leaders and perforated or open jointed drain tile, test the piping of plumbing drainage and venting systems upon completion of the rough piping installation. Tightly close all openings in the piping system, and fill with water to the point of overflow, but not less than 10' head of water. Water level shall not drop during the period from 15 minutes before the inspection starts, through completion of the inspection. Inspect all joints or leaks.

4. Finished plumbing test procedures: After the plumbing fixtures have been set and their traps filled with water, their connections shall be tested and approved gas and watertight. Plug the stack openings on the roof and building drain where it leaves the building, and introduce air into the system equal to a pressure of 1 inch water column. Use a "U" tube or manometer inserted in the trap of a water closet to measure this pressure. Air pressure shall remain constant without the introduction of additional air throughout the period of inspection. Inspect all plumbing fixture connections for gas and water leaks.

5. Repair all leaks and defects using new materials and retest system or portion thereof until satisfactory results are obtained.

6. Prepare reports for all tests and required corrective action.

3.12 ADJUSTING AND CLEANING

A. Clean exterior of piping system. Remove dirt and debris as work progresses.

B. Clean drain strainers, domes and traps. Remove dirt and debris.

3.13 PROTECTION

A. Protect drains during remainder of construction period, to avoid clogging with dirt and debris, and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of day or whenever the work stops.

END OF SECTION
SECTION 15488

NATURAL GAS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1, apply to work of this section.

B. The requirements of the following Division-15 sections apply to this section:

   1. Basic Mechanical Requirements.
   2. Basic Piping Materials and Methods.

1.2 SUMMARY

A. This section specifies distribution piping systems for natural gas within the building and extending from the point of delivery to the connections with gas utilization devices. Piping materials and equipment specified in this section include:

   1. Pipes, fittings and specialties.
   2. Special duty valves.

B. This section does not apply to LP gas piping; industrial gas applications using such gases as acetylene and acetylenic compounds, hydrogen, ammonia, carbon monoxide, oxygen and nitrogen; gas piping, meters, gas pressure regulators and other appurtenances used by the serving gas supplier in distribution of gas.

C. Gas pressures for systems specified in this section are limited to 5 psig.

D. Related Sections: The following sections contain requirements that relate to this section:

   1. Division 2: "Earthwork" for trenching and backfilling for installation of gas piping.
   2. Division 15: "Mechanical Identification" for labeling and identification of gas piping systems.

1.3 DEFINITIONS

A. Pipe sizes used in this Specification are Nominal Pipe Size (NPS).

B. Gas Distribution Piping: A pipe within the building, which conveys gas from the point of delivery to the points of usage.

C. Gas Service Piping: The pipe from the gas main or other source of supply including the meter, regulating valve, or service valve to the gas distribution system of the building served.

D. Point of Delivery is the outlet of the service meter assembly, or the outlet of the service regulator.
1.4 SUBMITTALS

A. Submit test reports specified in Part 3 of this section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Installation and replacement of gas piping, gas utilization equipment and accessories, or repair and servicing of equipment shall only be performed by a qualified installer. The term qualified means experienced in such work (experienced shall mean having a minimum of five (5) previous projects similar in size and scope to this project), familiar with precautions required, and has complied with the requirements of the authority having jurisdiction. Upon request, submit evidence of such qualifications to the Architect.

B. Regulatory Requirements: Comply with the requirements of the following codes:

1. NFPA 54 - National Fuel Gas Code, for gas piping materials and components, gas piping installations, and inspection, testing, and purging of gas piping systems.

C. Uniform Plumbing Code.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate the installation of pipe sleeves for wall penetrations.

1.7 EXTRA MATERIALS

A. Valve Wrenches: Furnish to Owner, with receipt, 2 valve wrenches for each type of gas valve installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering gas piping system products which may be incorporated in the work include, but are not limited to, the following:


2.2 PIPE AND TUBING MATERIALS

A. General: Refer to Part 3, Article "PIPE APPLICATION" for identification of systems where the below specified type and fitting materials are used.

B. Steel Pipe: Above ground, ASTM A 120, Schedule 40, seamless, black steel pipe, beveled ends.

C. PE Pipe (Underground Outside Building): Polyethylene (PE), Type PE 2406; 1-1/2 inch size and smaller SDR-9, 2 inch and larger SDR-11. Pipe and tubing continuously and permanently marked with the following:

1. Manufacturer's name or trademark.
2. ASTM D2513.
3. Size
4. PE 2406
5. "SDR" number.
7. Quality Control ID markings.
8. UPC logo.

2.3 FITTINGS

A. Malleable Iron Threaded Fittings: Above ground, ANSI B16.3, Class 150, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.

B. Joint Compound: Suitable for the gas being handled.

C. Steel Fittings: ASTM A 234, seamless or welded, for welded joints.

D. PE Fittings: Polyethylene PE 2406, copper alloy, stainless steel or other listed materials. Transition fittings shall be approved compression type couplings or other special listed joints. Fittings shall be marked with the following:

1. Manufacturer's name or trademark.
2. Size.
4. UPC logo.

2.4 PIPING SPECIALTIES

A. Unions: ANSI B16.39, Class 150, black malleable iron; female pattern; brass to iron seat; ground joint.

B. Dielectric Unions: ANSI B16.39, Class 250; malleable iron and cast bronze; with end connections suitable for pipe to be joined; designed to isolate galvanic and stray current corrosion.

C. Protective Coating: When metal piping will be in contact with material or atmosphere exerting a corrosion action, pipe and fittings shall be coated with polyethylene tape, having the following properties:

1. Overall thickness: 20 mils; synthetic adhesive; water vapor transmission rate, 0.10 or less gallons per 100 square inch, water absorption 0.02 percent or less.

D. Prime pipe and fittings with a compatible primer prior to application of tape.

2.5 VALVES

A. General Duty Valves (i.e. gate, globe, check, ball and butterfly valves): Specified in Division 15 Section "Valves". Special duty valves are specified in this article by their generic name; refer to Part 3 below, article "VALVE APPLICATION" for specific uses and applications for each valve specified.

B. Gas Cocks 2 Inch and Smaller: 150 psi WOG, bronze body, straightaway pattern, square head, threaded ends.

C. Gas Line Pressure Regulators: Single stage, steel jacketed, corrosion-resistant gas pressure regulators; with atmospheric vent, elevation compensator; with threaded ends for 2 inch and smaller, flanged ends for 2-1/2 inch and larger; for inlet and outlet gas pressures, specific gravity, and volume flow indicated.
PART 3 - EXECUTION

3.1 PREPARATION

A. Conform to the requirements in NFPA 54, for the prevention of accidental ignition.

3.2 PIPE APPLICATIONS

A. Use steel pipe above ground with threaded joints and fittings for 2 inch and smaller, and with welded joints for 2-1/2 inch and larger. Use polyethylene pipe and fittings below ground from meter to building.

3.3 PIPING INSTALLATIONS

A. General: Install piping to conform to the requirements of NFPA 54 - National Fuel Gas Code and Uniform Plumbing Code.

B. Locations and Arrangements: Drawings (plans, schematics and diagrams) indicate the general location and arrangement of piping systems. Design locations and arrangements of piping take into consideration pipe sizing, flow direction, slope of pipe, expansion, and other design considerations. So far as practical, install piping as indicated.

3.4 ABOVE GROUND

A. Concealed Locations: Except as specified below, install concealed gas piping in airtight sleeves.

B. Above-Ceiling Locations: Gas piping may be installed in accessible above ceiling spaces (subject to the approval of the authority having jurisdiction), except where such spaces are used as a plenum. Valves shall not be located in such spaces.

C. Piping in Partitions: Concealed piping shall not be located in solid partitions.

D. Prohibited Locations: Do not install gas piping in or through a circulating air duct, clothes chute, chimney or gas vent, ventilating duct, dumb waiter or elevator shaft.

E. Install pipe sleeve seals at foundation penetrations, as specified in Division 15: "Basic Piping Materials and Methods".

F. Seal pipe penetrations of fire barriers using fire barrier penetration sealers specified in Division 7: "Joint Sealers".

G. Hanger, supports and anchors are specified in Division 15: "Supports and Anchors". Conform to the table below for maximum spacing of supports.

Steel Pipe:

<table>
<thead>
<tr>
<th>Size (NPS)</th>
<th>Spacing in Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot;</td>
<td>6</td>
</tr>
<tr>
<td>3/4&quot; to 1&quot;</td>
<td>8</td>
</tr>
<tr>
<td>1-1/4&quot; &amp; larger (horizontal)</td>
<td>10</td>
</tr>
<tr>
<td>1-1/4&quot; and larger (vertical)</td>
<td>Every floor level</td>
</tr>
</tbody>
</table>

I. Install gas piping at a uniform grade of 1/4 inch in 15 feet, upward to risers, and from the risers to the meter (or service regulator when meter is not provided), or the equipment.
J. Make reductions in pipe sizes using eccentric reducer fittings installed with the level side
down.

K. Make changes in directions and branch connections using fittings.

L. Install unions in pipes 2 inch and smaller, adjacent to each valve, at final connections of each
piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.

M. Install dielectric unions where piping of dissimilar metals are joined.

N. Install flanges on valves, apparatus and equipment having 2-1/2 inch and larger connections.

O. Install strainer on the supply side of each control valve, pressure reducing valve, pressure
regulating valve, solenoid valve, and elsewhere as indicated.

P. Anchor piping to ensure proper direction of expansion and contraction.

3.5 BELOW GROUND

A. General: Install piping in conformance with IAPMO Installation Standards IS 12-85 and local
authorities having jurisdiction. Provide one #12 bare copper trace wire.

3.6 PIPE JOINTS

A. Welded Joints: Comply with the requirements in ASME Boiler and Pressure Vessel Code,
Section IX.

B. Threaded Joints: Conform to ANSI B1.20.1, tapered pipe threads for field cut threads. Join
pipe, fittings, and valves as follows:

C. Note the internal length of threads and fittings or valve ends, and proximity of internal seat or
wall, to determine how far pipe should be threaded into joint. Refer to NFPA 54, for guide for
number and length of threads for field threading steel pipe.

D. Align threads at point of assembly.

E. Apply appropriate tape or thread compound to the external pipe threads.

F. Assemble joint to appropriate thread depth. When using a wrench on valves, place the
wrench on the valve end into which the pipe is being threaded.

G. Damaged Threads: Do not use pipe with threads which are stripped, chipped, corroded, or
otherwise damaged. If a weld opens during cutting or threading operations, that portion of
pipe shall not be used.

H. Polyethylene Joints: Heat fused joints shall be made as recommended by the manufacturer.
Transition from below to above ground shall be made by a single transition sweep fitting.
Metal pipe shall be stainless steel or protected as here in before specified under "Protective
Coating".
3.7 VALVE APPLICATIONS
   A. General: The Drawings indicate valve types, locations, and arrangements.
   B. Shut-Off Duty: Use gas cocks specified in Part 2 above.

3.8 VALVE INSTALLATIONS
   A. Install valves in accessible locations, protected from physical damage. Tag valves with a metal tag attached with a metal chain indicating the piping systems supplied.
   B. Install a gas cock upstream of each gas pressure regulator. Where two gas pressure regulators are installed in series in a single gas line, a manual valve is not required at the second regulator.
   C. Install pressure relief or pressure limiting devices so they can be readily operated to determine if the valve is free; so they can be tested to determine the pressure at which they will operate; and examined for leakage when in the closed position.

3.9 TERMINAL EQUIPMENT CONNECTIONS
   A. Install gas cock upstream and within 6 feet of gas appliance. Install a union or flanged connection downstream from the gas cock to permit removal of controls.
   B. Sediment Traps: Install a tee fitting with the bottom outlet plugged or capped as close to the inlet of the gas appliance as practical. Drip leg shall be a minimum of 3 pipe diameters in length.

3.10 ELECTRICAL BONDING AND GROUNDING
   A. Install above ground portions of gas piping systems, upstream from equipment shutoff valves, electrically continuous and bonded to a grounding electrode, in accordance with NFPA 70 - "National Electrical Code".
   B. Do not use gas piping as a grounding electrode.
   C. Conform to NFPA 70 - "National Electrical Code", for electrical connections between wiring and electrically operated control devices.

3.11 FIELD QUALITY CONTROL
   A. Piping Tests: Inspect, test, and purge natural gas systems in accordance with NFPA 54, and local utility requirements.

END OF SECTION
SECTION 15600

REFRIGERATION EQUIPMENT

PART 1 - GENERAL

1.1 SUBMITTALS

A. Provide submittals in accordance with Division 01 and Section 15010: Basic Mechanical Requirements.

B. Manufacturer's Data:

1. Complete list of items proposed to be furnished and installed under this section. Material lists, which do not require performance data, shall include manufacturer's names, types, and model numbers for usages indicated.

2. Manufacturer's specifications and data required to demonstrate compliance with specified requirements. Literature shall include descriptions of equipment, types, models and sizes proposed, capacity tables or curves marked to indicate performance characteristics, electrical requirements, options selected, space requirements (including allowances for servicing if indicated) and data necessary to ensure compliance with requirements of these Specifications and performance indicated on Drawings. Data shall also include name and address of nearest service and maintenance organization that regularly stocks repair parts. Listings of items that function as parts of an integrated system shall be furnished at one time.

3. Shop Drawings indicating methods of installation of equipment and materials, sizes and gages of ducts, and details of supports. Items to be indicated shall include but are not limited to, the following:

   a. Layout of proposed ductwork, and equipment drawn to scale, to establish that equipment will fit into allotted spaces with clearance for installation and maintenance. Indicate proposed details for attachment, anchoring to, and hanging from structural framing of building. Indicate vibration isolation units, foundations and supports, and openings for passage of pipes and ducts.

   b. Drawings indicating locations and sizes of sleeves and prepared openings for pipes and ducts.

   c. Typical details of supports for equipment and ductwork.

1.2 PRODUCT HANDLING

A. Protection, Replacements, Delivery and Storage: Comply with provisions stated in Section 15010: Basic Mechanical Requirements.

1.3 COORDINATION

A. Coordinate related and adjacent activities in accordance with provisions of Section 01100: Coordination.

1.4 SUBMITTALS
A. Submit unit performance data including: capacity, nominal and operating performance.

B. Submit mechanical specifications for unit and accessories describing construction, components and options.

C. Submit shop drawings indicating overall dimensions as well as installation, operation and service clearances. Indicate lift points and recommendations and center of gravity. Indicate unit shipping, installation and operating weights including dimensions.

D. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA. Sequence of operation, safety and start-up instructions.

1.5 DELIVERY, STORAGE AND HANDLING

A. Comply with manufacturers installation instructions for rigging, unloading and transporting units.

B. Protect units on site from physical damage. Protect coils.

1.6 WARRANTY

A. Provide parts warranty for one year from start-up or 18 months from shipment, whichever occurs first.

1.7 MAINTENANCE SERVICE

A. Furnish complete parts and labor service and maintenance of packaged roof top units for one year from Date of Substantial Completion by contractor.

B. Provide maintenance service with a two month interval as maximum time period between calls. Provide 24 hour emergency service on breakdowns and malfunctions.

C. Include maintenance items as outlined in manufacturer's operating and maintenance data.

D. Submit copy of service call work order or report and include description of work performed.

1.8 REGULATORY REQUIREMENTS

A. Unit shall conform to ANSI Z21.47/UL 1995 for construction of packaged air conditioner.

1. In the event the unit is not UL approved, the manufacturer must, at his expense, provide for a field inspection by a UL representative to verify conformance to UL standards. If necessary, contractor shall perform modifications to the unit to comply with UL, as additional expense to the Owner.

B. Approved Manufacturers

1. Base bid shall be Trane with alternatives by Carrier and York.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Capacities of equipment and material shall be not less than those indicated on Drawings. Capacities of refrigerating equipment as indicated on Drawings are net rated output as
required, based on load and ambient air temperature condition at the Project site. Ambient air temperature indicated for rating purposes is standard in manufacturer’s tables.

2.2 GENERAL UNIT DESCRIPTION

A. Provide self-contained, packaged, factory-assembled and pre-wired units suitable for outdoor use consisting of cabinet, compressors, condensing coil and fans, integral subcooling circuits, filter driers and controls.

B. Performance Ratings: Energy Efficiency Rating (EER) [and Co-efficient of Performance (COP)] not less than prescribed by ANSI/ASHRAE 90A.

2.3 CASING

A. House components in 18 gauge zinc-coated galvanized steel frame and panels with weather resistant, baked enamel finish. Units’ surface shall be tested 500 hours in salt spray test.

B. Mount controls in weatherproof panel provided with removable panels and/or access doors with quick opening fasteners.

2.4 CONDENSER COILS

A. Coils: Aluminum fins mechanically bonded to seamless cooper tubing. Provide subcooling circuit(s). Factory leak test under water to 450 psig and vacuum dehydrate. Seal with holding charge of nitrogen.

2.5 FANS AND MOTORS

A. Vertical discharge direct driven propeller type condenser fans with fan guard on discharge. Fans shall be statically and dynamically balanced.

B. Weatherproof motors suitable for outdoor use, with permanently lubricated totally enclosed or open construction motors shall be provided and shall have built in current and thermal overload protection. Motors shall be either sleeve or ball bearing type.

2.6 COMPRESSORS

A. Compressors: Provide direct-drive hermetic, scroll type compressors with centrifugal oil pump providing positive lubrication to moving parts and automotive type pistons, rings to prevent gas leakage, internal suction and discharge valves and crankcase heater. Motor shall be suction gas-cooled with internal temperature and current sensitive motor overloads. Internally isolated motors on springs. External high and low pressure cutout devices shall be provided.

2.7 REFRIGERANT PIPING

A. Main liquid and suction lines from the condensing unit to evaporator coil shall be of sizes indicated on Drawings.

B. Refrigeration piping shall be refrigeration grade copper tubing, type L hard-drawn. In instances where refrigeration lines must be snaked through conduits or trenches, that portion of tubing required to complete connections may be soft drawn. System shall be clean and dry during and after installation. Pipe shall be sealed until installed.
C. Refrigeration lines, both hard and soft drawn, shall be straight and free from kinks, restrictions or traps. Horizontal runs shall be sloped towards compressor one inch per 10 feet wherever possible.

D. Joints shall be furnished with Silfos 15, Silvaloy 15, or equal, high melting point solder.

E. Flare nuts required on suction lines shall be of short forged or frost-proof type. All other fittings shall be standard sweat-soldered type. Els and return bends shall be long radius type. Install leak lock material. Cast fittings are not permitted.

F. Refrigeration Piping: Joints shall be silver brazed and leak tested. Field fabricated lines shall be thoroughly flushed and cleaned before connection. Bleed nitrogen through lines during silver brazing. Cap and seal lines when not completed or connected to equipment.

G. Sleeve: Provide 24 gage galvanized iron pipe and chrome plated escutcheon plates at penetrations of floors, walls and ceiling to allow free motion of pipe. Pack annular space between pipe and sleeve with incombustible material, and seal each end with mastic waterproofing compound.

H. Install insulated couplings at points of connection between dissimilar metals for cathodic protection. Insulate copper tubing from ferrous materials and hangers with 2 thicknesses of 3-inch wide strip of 10-mil polyvinyl tape wrapped around pipe.

I. Support piping with iron hangers and supports, as required by manufacturer's recommendations. Provide saddles to protect pipe insulation.

J. Provide connections of copper and brass pipe and tubing with 95-5 tin-antimony, ASTM B 32, grade 5A solder.

2.8 CONTROLS

A. Provide factory-wired condensing units with 24 volt control circuit with internal fusing and control transformers, contractor pressure lugs and/or terminal block for power wiring. Contractor to provide field installed unit mounted disconnect switch. Units shall have single point power connections.

2.9 REFRIGERANT VALVES

A. Refrigerant valves for freon in copper pipe systems shall be bronze, diaphragm packless type with soldered ends. Valves 1-1/8 inches to 4-1/8 inches shall be bronze seal cap, back-seating type with soldered ends. In sizes larger than 4-1/8 inches, valves shall be semi-steel bodies with flanged ends.

B. Magnetic solenoid valves in freon refrigerant lines shall be provided with bronze bodies, with soldered or flanged ends and shall be furnished with manual opening stem. Solenoids shall be suitable for actual operating voltage provided.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install equipment as indicated on Drawings and in compliance with manufacturers' recommendations, with vibration isolation, mounting pads or foundations as may be required and flexible connectors as specified herein or in related sections.
B. Inspect areas under which Work of this section will be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 EQUIPMENT FOUNDATIONS

A. Equipment foundations, where indicated, shall be of sufficient size and weight and of proper design to preclude shifting of equipment under operating conditions, or under abnormal conditions which could be imposed upon equipment. Foundations shall meet requirements of equipment manufacturer, and when required by the Architect, obtain from equipment manufacturer approval of foundation design and construction for equipment furnished. Equipment vibration shall be maintained within the limits as required by the manufacturer.

3.3 EQUIPMENT DESIGN AND INSTALLATION

A. Uniformity: Unless otherwise specified, equipment of same type or classification shall be product of same manufacturer.

B. Application: No equipment shall be installed in an application or in such a manner that is not recommended by the manufacturer.

C. Design: Equipment shall be designed in accordance with applicable ASME, UL or other required technical standards.

1. Pressure vessels shall be ASME code construction and shall be so stamped.

D. Equipment Installation: Equipment installation shall be strictly in accordance with these Specifications, and installation instructions of manufacturers. Equipment installed on concrete foundations shall be grouted before piping is installed. Piping shall be installed in such a manner as not to place a strain on any equipment. Flanged joints shall be provided and adequately extended before installation. Piping shall be graded, anchored, guided and supported, without low pockets.

1. Install equipment properly aligned, leveled, and adjusted for satisfactory operation.

2. Install equipment so connecting and disconnecting of piping and accessories can be readily accomplished, and so those parts are easily accessible for inspection, service, and repair.

E. Refrigerant Piping Installation: Refrigerant piping shall be carefully installed to prevent vibration from compressor pulsations. Unless sized on Drawings, pipe shall be sized from minimum gas velocities necessary for oil control. No pre-charged piping is permitted.

1. Suction lines shall be graded toward compressors. Oil traps or accumulators shall be provided to prevent slugging or damage to compressors.

2. Piping shall be complete with liquid and suction refrigerant lines, condensate drain lines, thermostatic expansion valves, filter-driers, liquid-moisture indicators, heat exchangers, flexible connections, purge valves, crankcase pressure-limiting valves and vibration isolators.

3. Liquid and suction refrigerant piping shall be service copper tubing, Type L, hard-drawn, where installation is in accessible spaces. Soft-drawn copper tubing, continuous without joints, shall be furnished where lines are installed in inaccessible spaces.
4. Suction piping shall be insulated with foamed plastic insulation. Refer to Section 15080: Mechanical Insulation.

5. Condensate drain shall be 7/8 inch tempered, Type M copper tubing.

3.4 NOISE AND VIBRATION

A. Install units on vibration isolation.

B. Operation of Equipment: Mechanical equipment and piping systems shall operate at lowest vibration and noise levels possible.

C. Corrective Measures: If objectionable noise and vibration occur, provide necessary and/or required changes to furnish satisfactory results.

3.5 FIELD TESTS AND INSPECTION

A. Perform field inspections, field tests and trial operations as specified in Section 15010: Basic Mechanical Requirements. Provide labor, equipment and incidentals required for testing. The IOR will witness field tests and trial operations as specified in Section 15010: Basic Mechanical Requirements.

B. Equipment and Material: Equipment and material certified as having been successfully tested by manufacturer, in accordance with referenced Specifications and standards, will not require re-testing before installation. Equipment and material not tested at place of manufacture will be tested before or after installation, as applicable, or where required to determine compliance with Specifications and standards.

C. Start-Up and Operational Test: System shall be started up and initially operated with all components operating. During this time, various strainers shall be periodically cleaned until no further accumulation of foreign material occurs. Exercise care to ensure that minimum loss of water occurs when strainers are cleaned. Adjust safety and automatic control instruments as necessary to provide proper operation and sequence. Refer to Section 15010: Basic Mechanical Requirements.

D. Extent of Field Tests: After installation and before Substantial Completion, Work of this section shall be subjected to required field tests, including those specified, and listed in Section 15010: Basic Mechanical Requirements.

E. Operation and Maintenance Data: Provide required operation and maintenance data as specified in Section 15010: Basic Mechanical Requirements.

3.6 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.7 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION
SECTION 15700
HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes: Air conditioning and air handling equipment as indicated on Drawings and as specified. Air conditioning and air handling equipment shall include but not be limited to following:
   1. Central Station Air Handling Units.
   2. Split System Air Conditioning Units.
   3. Fans.

C. Related Sections:
   1. Section 15010: Basic Mechanical Requirements.
   2. Section 15050: Basic Mechanical Materials and Methods.
   3. Section 15070: Mechanical Sound, Vibration and Seismic Control.
   5. Section 15400: Plumbing.
   7. Section 15800: Air Distribution.
   8. Section 15900: HVAC Instrumentation and Controls.

1.2 SUBMITTALS

A. Provide in accordance with Division 01 and Section 15010: Basic Mechanical Requirements.

B. No equipment shall be fabricated or delivered until the receipt of approved shop drawings from the Owner or Owner's approved representative.

C. AHU manufacturer shall provide the following information with each shop drawing/product data submission:
   1. All electrical, piping and ductwork requirements, including sizes, connection locations and connection method recommendations.
2. Each component of the unit shall be identified and mechanical specifications shall be provided for unit and accessories describing construction, components and options.

3. All performance data, including capacities and airside and waterside pressure drops, for components.

4. Fan curves shall be provided for fans with the design operating points indicated. Data shall be corrected to actual operating conditions, temperatures and altitudes.

5. A filter schedule must be provided for each air handling unit supplied by the air handling unit manufacturer. Schedule shall detail unit tag, unit size, corresponding filter section location within the AHU, filter arrangement (e.g. angled/flat), filter depth, filter type (e.g. pleated media), MERV rating and filter quantity and size.

6. A schedule detailing necessary trap height shall be provided for each air handling unit. Schedule shall detail unit tag, unit size, appropriate trap schematic with recommended trap dimensions and unit supplied base rail height. Contractor shall be responsible for additional trap height required for trapping and insulation beyond the unit supplied base rail height by adequate housekeeping pad.

7. A coil valve coordination schedule shall be provided for each air handling unit supplied by the air handling unit manufacturer. Schedule shall detail unit tag, coil type and corresponding section location within the AHU, corresponding section location within the AHU, valve style (e.g. global, ball), valve type (e.g. electronic 2-way/3-way), valve position (e.g. normally open/closed), size, flow coefficient (CV) and close-off pressure.

8. An electrical MCA – MOP schedule shall be provided for each electrical circuit to which field-power must be supplied. Schedule to detail unit tag, circuit description, voltage/phase/hertz, Minimum Circuit Amperage (MCA) and calculated Maximum Overcurrent Protection (MOP).

9. Sound data shall be provided using ARI 260 test methods. Unit discharge, inlet and radiated sound power levels in dB shall be provided for 63, 125, 250, 500, 1000, 2000, 4000 and 8000Hz.

D. The AHU manufacturer shall provide appropriate sets of submittals as referenced in the General Conditions and shall submit to the Owner electronic copies of the IOM.

E. The AHU manufacturer shall list any exceptions to the specification.

1.3 REGULATOR REQUIREMENTS

A. Agency Listings/Certifications

1. Unit shall be manufactured to conform to UL 1995 and shall be listed by either UL/CUL or ETL. Units shall be provided with listing agency label affixed to the unit. In the event the unit is not UL/CUL or ETL approved, the contractor shall, at his/her expense, provide for a field inspection by a UL/CUL or ETL representative to verify conformance. If necessary, contractor shall perform modifications to the unit to comply with UL/CUL or ETL as directed by the representative, at no additional expense to the owner.
2. Certify air handling units in accordance with ARI Standard 430. Units shall be provided with certification label affixed to the unit. If air handling units are not certified in accordance with ARI Standard 430, contractor shall be responsible for expenses associated with testing of units after installation to verify performance of fan(s). Any costs incurred to adjust fans to meet schedule capacities shall be the sole responsibility of the contractor.

3. Certify air handling coils in accordance with ARI Standard 410. Units shall be provided with certification label affixed to the unit. If air handling coils are not certified in accordance with ARI Standard 410, contractor shall be responsible for expenses associated with testing of coils after installation to verify performance of coil(s). Any cost incurred to adjust coils to meet scheduled capacities shall be the sole responsibility of the contractor.

1.4 DELIVERY, STORAGE AND HANDLING

A. Comply with manufacturer's installation instructions for rigging, unloading and transporting units.

B. Units shall ship fully assembled up to practical shipping and rigging limitations. Units not shipped fully assembled shall have tags and airflow arrows on each section to indicate location and orientation in direction of airflow. Shipping splits shall be clearly defined on submittal drawings. Cost associated with non-conformance to shop drawings shall be the responsibility of the manufacturer. Each section shall have lifting lugs for field rigging; lifting and final placement of AHU section(s). AHU's less than 100-inches wide shall allow for forklift transport and maneuverability on the jobsite.

C. Deliver units to jobsite with fan motor (s), sheave (s) and belt (s) completely assembled and mounted in units.

D. Unit shall be shipped in a clear shrink-wrap or stretch-wrap to protect unit from in-transit rain and debris per ASHRE 62.1 recommendations.

E. Installing contractor shall be responsible for storing AHU in a clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures and finish.

1.5 START-UP AND OPERATING REQUIREMENTS

A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters in place, bearings lubricated (if applicable), condensate properly trapped, piping connections verified and leak-tested, belts aligned and tensioned, all shipping braces removed, bearing set screws torqued, and fan has been test run under observation.

1.6 WARRANTY

A. AHU manufacturer shall provide, at no additional cost, a standard parts warranty that covers a period of one year from unit start-up or 18 months from shipment, whichever occurs first. This warrants that all products are free from defects in material and workmanship and shall meet the capacities and ratings set forth in the equipment manufacturer's catalog and bulletings.

1.7 QUALITY ASSURANCE

A. Provide submittals in accordance with Section 15010: Basic Mechanical Requirements.
PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Approved manufacturer shall be Trane, with pre-approved alternates considered. Manufacturers not pre-approved, must obtain pre-approval in writing from consulting engineer prior to bid day. Alternates must comply with all performance and features as called for in this specification. Job awarded on basis of specified equipment. Alternate will be evaluated and considered after job is awarded.

B. Manufacturer must clearly define any exceptions made to Plans and Specifications. Any deviations in layout or arrangement shall be submitted to consulting engineer prior to bid date. Acceptance of deviation(s) from specifications shall be in the form if written approval from the consulting engineer. Mechanical Contractor is responsible for expenses that occur due to exceptions made.

C. Approved Manufacturers:

1. Trane
2. Temptrol
3. Haakon

2.2 GENERAL

A. Manufacturer to provide an integral base frame and roof curb to raise all sections of the unit for proper trapping. Contractor will be responsible for providing a housekeeping pad when unit base frame is not of sufficient height to properly trap unit. Unit base frames not constructed of galvanized steel shall be chemically cleaned and coated with both a rust-inhibiting primer and finished coat of rust-inhibiting enamel. Unit base height to be included in trap.

2.3 UNIT CASING

A. Unit manufacture shall ship unit in segments as specified by the contractor for ease of installation in tight spaces. The entire air handler shall be constructed of galvanized steel. Casing finished to meet ASTM B117 250-hour salt-spray test. The removal of access panels or access doors shall not affect the structural integrity of the unit. All removable panels shall be gasketed. All doors shall have gasketing around full perimeter to prevent air leakage. Contractor shall be responsible to provide connection flanges and all other framework that is needed to properly support the unit.

B. Casing performance – Casing air leakage shall not exceed leak class 6 (CL = 6) per AHSRE 111 at specified casing pressure, where maximum casing leakage (cfm/100 ft2 of casing surface area) = CL x PO.65.

C. Air leakage shall be determined at 1.00 times maximum casing static pressure up to 8 inches w.g. Specified air leakage shall be accomplished without the use of caulk. Total estimated air leakage shall be reported for each unit in CFM, as a percentage of supply air and as an ASHRAE 111 Leakage Class.

D. Under 55°F supply air temperature and design conditions on the exterior of the unit of 81°F dry bulb and 73°F wet bulb, condensation shall not form on casing exterior. The AHU manufacturer shall provide tested casing thermal performance for the scheduled supply
air temperature plotted in a psychometric chart. The design condition on the exterior of
the unit shall also be plotted on the chart. If tested casing thermal data is not available,
AHU manufacturer shall provide, in writing to the Engineer and Owner, a guarantee
against condensation forming on the unit exterior at the stated design conditions above.
The guarantee shall note that the AHU manufacturer will cover all expenses associated
with modifying units in the field should external condensate form on them. In lieu of AHU
manufacturer providing a written guarantee, the installing contractor must provide
additional external insulation on AHU prevent condensation.

E. Unit casing (wall/floor/roof panels and doors) shall be able to withstand up to 1.5 times
design static pressure, or 8-inche w.g., whichever is less and shall not exceed 0.0042 per
inch panel span (L/240).

F. Floor panels shall be double-wall construction and designed to support a 250-lb load
during maintenance activities and shall deflect no more than 0.0042 per inch of panel
span.

G. Unit casing panels shall be 2-inch double-wall construction, with solid galvanized exterior
and solid galvanized interior, to facilitate cleaning of unit interior.

H. Unit casing panels (roof/walls/floor) and doors shall be provided with a minimum thermal
resistance (R-value) of 13 Hr°F/It2°F/BTU.

I. Unit casing panels (roof, walls, floor) and external structural frame members shall be
completely insulated filling the entire panel cavity in all directions so that no voids exist.
Panel insulation shall comply with NFPA 90A.

J. Casing panel inner liners must not extend to the exterior of the unit or contact the exterior
frame. A mid-span, no-through-metal, internal thermal break shall be provided for all unit
casing panels.

K. Access panels and doors shall be fully removable without the use of specialized tools to
allow complete access of interior surfaces.

2.4 ACCESS DOORS

A. Access doors shall be 2-inch double-wall construction. Interior and exterior shall be of the
same construction as the interior and exterior wall panels.

B. All doors downstream of the cooling coil shall be provided with a thermal break
construction of door panel and door frame.

C. Gasketing shall be provided around the full perimeter of the doors to prevent air leakage.

D. Door hardware shall be surface-mounted to prevent though-cabinet penetrations that
could likely weaken the casing leakage and thermal performance.

E. Handle hardware shall be designed to prevent unintended closure.

F. Access doors shall be hinged and removable without the use of specialized tools to allow.

G. Hinges shall be interchangeable with the door handle hardware to allow for alternating
doors swing in the field to minimize access interference due to unforeseen job site
obstructions.
H. Door handle hardware shall be adjustable and visually indicate locking position of door latch external to the section.

I. All doors shall be a 60-inch high when sufficient unit height is available, or the maximum height allowed by the unit height.

J. Multiple door handles shall be provided for each latching point of the door necessary to maintain the specified air leakage integrity of the unit.

2.5 PRIMARY DRAIN PANS

A. All cooling coil sections shall be provided with an insulated, double-wall, galvanized drain pan.

B. The drain pan shall be designed in accordance with ASHRAE 62.1 being of sufficient size to collect all condensation produced from the coil and sloped in two planes, pitched toward drain connections, promoting positive drainage to eliminate stagnant water conditions when unit was installed level and trapped per manufacturer's requirements. See section 2.7; paragraph F through H for specifications on intermediate drain pans between cooling coils.

C. The outlet shall be located at the lowest point of the pan and shall be sufficient diameter to preclude drain pan overflow under any normally expected operating condition.

D. All drain pan threaded connections shall be visible external to the unit. Threaded connections under the unit floor shall not be accepted.

E. Drain connections shall be of the same material as the primary drain pan and shall extend a minimum 2-1/2-inch beyond the base to ensure adequate room for field piping of condensate traps.

F. The installing contractor is responsible to ensure the unit was installed level, trapped in accordance with the manufacturer's requirements and visually inspected to ensure proper drainage of condensate.

G. Coil support members inside the drain pan shall be of the same material as the drain pan and coil casing.

H. If drain pans are required for heating coils, access sections or mixing sections they will be indicated in the plans.

2.6 FANS

A. Fan section shall have a minimum of one hinged and latched access door located in the drive side of the unit to allow inspection and maintenance of the fan, motor, and drive components. Construct door(s) per Section 2.4.

B. Provide fans of type and class as specified on the schedule. Fan shafts shall be solid steel, coated with a rust-inhibiting coating and properly designed so that fan shaft does not pass through first critical speed as unit comes up to rated RPM. All fans shall be statically and dynamically tested by the manufacturer for vibration and alignment as an assembly at the operating RPM to meet design specifications. Fans controlled by variable frequency drives shall be statically and dynamically tested to vibration and alignment at speeds between 25% and 100% of design RPM. If fans are not factory-tested for vibration and alignment, the contractor shall be responsible for cost and labor associated with field
balancing and certified vibration performance. Fan wheels shall be keyed to fan shafts to prevent slipping.

C. Belt-driven fans shall be provided with grease lubricated, self-aligning, anti-friction bearings selected for L-50 200,000-hour average life per ANSI/AFBMS Standard 9. Lubrication lines for both bearings shall be extended to the drive side of the AHU and rigidly attached to support bracket with Zerk fittings. Lubrication lines shall be a clear, high-pressure, polymer to air in visual inspection. If extended lubrication lines are not provided, manufacturer shall provide permanently lubricated bearing with engineering calculations for proof of bearing life.

D. All fans, including direct drive plenum fans, shall be mounted on isolation bases. Internally-mounted motor shall be on the same isolation base. Fan and motor shall be internally isolated with spring isolators. Unit sizes up to a nominal 4,000 CFM shall have 1-inch spring isolation. Units with nominal CFM’s higher than 4,000 shall have 2-inch springs. A flexible connection (e.g. canvas duct) shall be installed between fan and unit casing to ensure complete isolation. Flexible connection shall comply with NFPA 90A and UL 181 requirements. If fans and motors are not internally isolated from the building, including supply and return duct work, piping and electrical connections. External isolation shall be furnished by the installing contractor in order to avoid transmission of noise and vibration through the ductwork and building structure.

E. Motors and Drives

1. All motor and drives shall be factory-installed and run tested. All motors shall be installed on a slide base to permit adjustable of belt tension. Slide base shall be designed to accept all motor sizes offered by the air-handler manufacturer for that fan size to allow a motor change in the future, should airflow requirements change. Fan sections without factory-installed motors shall have motor field installed by the contractor. The contractor shall be responsible for all costs associated with installation of motor and drive, alignment of sheaved and belts. Run testing of the motor, and balancing of the assembly.

2. Motors shall meet or exceed all NEMA Standards Publication MG 1 – 2006 requirements and comply with NEMA Premium efficiency levels when applicable. Motors shall comply with applicable requirements of NEC and shall be UL listed.

3. Fan motors shall be heavy duty, open drip-proof operable at 460 volts, 60Hz, 3-phase. If applicable, motor efficiency shall meet or exceed NEMA Premium efficiencies.

4. Belt driven fans shall use 4-pole, 1800 rpm, motors, NEMA B design, with Class B insulation capable to operate continuously at 104 deg F (40 deg C) without tripping overloads.

5. Direct driven fans shall use 2-pole (3600 rpm), 4-pole (1800 rpm) or 6-pole (1200 rpm) motors, NEMA Design B, with Class B insulation capable to operate continuously at 104 deg F (40 deg C) without tripping overloads.

6. Motor shall have a +/- 10 percent voltage utilization range to protect against voltage variation.

7. V-belt drive shall be fixed pitch rated at 1.5 times the motor nameplate. Drives 20 hp and larger or any drives on units equipped with VFDs shall be fixed pitch.
2.7 COILS

A. Coils section header end panel shall be removable to allow for removal and replacement of coils without impacting the structural integrity of the unit.

B. Install coils such that headers and return bends are enclosed by unit casing to ensure that if condensate forms on the header or return bends, it is captured by the drain pan under the coil.

C. Coils shall be manufactured with plate fins to minimize water carryout and maximum airside thermal efficiency. Fin tube holes shall have drawn and belled collars to maintain consistent fin spacing to ensure performance and air pressure drop across the coil as scheduled. Tubes shall be mechanically expended and bonded to fin collars for maximum thermal conductivity. Use of soldering or tinning during the fin-to-tube bonding process is not acceptable due to the inherent thermal stress and possible loss of bonding at that joint.

D. Conduct coil casings of galvanized steel. End supports and tube sheets shall have belled tube holes to minimize wear of the tube wall during thermal expansion and contraction of the tube.

E. All coils shall be completely cleaned prior to installation into the air handling unit. Complete fin bundle in direction of airflow shall be degreased and steam cleaned to remove any lubricants used in the manufacturing of the fins. Or dirt that may have accumulated, in order to minimize the chance for watch carryover.

F. When two or more cooling coils are stacked in the unit, an intermediate drain pan shall be installed between each coil. The intermediate drain pan shall be designed being of sufficient size to collect all condensation produced from the coil and sloped to promote positive drainage to eliminate stagnant water conditions. The intermediate drain pan shall be constructed of the same materials as the sections primary drain pan.

G. The intermediate drain pan shall begin at the leading face of the water-producing device and be of sufficient length extending downstream to prevent condensate from passing through the air stream of the lower coil.

H. Intermediate drain pan shall include downspouts to direct condensate to the primary drain pan. The intermediate drain pan outlet shall be located at the lowest point of the pan and shall be sufficient diameter to preclude drain pan overflow under any normally expected operating condition.

2.8 FILTERS

A. Provide factory-fabricated filter section of the same construction and finish as unit casings. Filter section shall have filter guides and access door (s) extending the full height of the casing to facilitate filter removal. Construct doors in accordance with Section 2.4. Provide fixed filter blockoffs as required to prevent air bypass around filters. Blockoffs shall not need to be removed during filter replacement.

B. Filter type, MERV rating and arrangement shall be provided as defined in project plans and schedule.

C. Manufacturer shall provide one set of startup filters.
2.9 DAMPERS
A. All dampers, with the exception of external bypass and multizones (if scheduled), shall be internally mounted. Dampers shall be premium ultra-low leak and located as indicated on the schedule and plans. Blade arrangement (parallel or opposed) shall be provided as indicated on the schedule and drawings. Dampers shall be Ruskin CD60 double-skin airfoil design or equivalent for minimal air leakage and pressure drop. Leakage rate shall not exceed 4 CFM/square foot at one inch water gauge complying with ASHRAE 90.1 maximum damper leakage and shall be AMCA licensed for Class 1A. All leakage testing and pressure ratings shall be based on AMCA Standard 500-D. Manufacturer shall submit brand and model of damper(s) being furnished, if not Ruskin CD60.

2.10 GRAVITY EXHAUST/INTAKE VENTILATORS
A. RV-1: Unit shall be a tiered spun aluminum, roof mounted gravity ventilator.
   1. Fan shall be manufactured at an ISO 9001 certified facility.
   2. The unit shall be of bolted and welded construction utilizing corrosion resistant fasteners. The spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. The aluminum base shall have continuously welded curb cap corners for maximum leak protection. The spun aluminum baffle shall have a rolled bead for added strength. Birdscreen constructed of 1/2" mesh shall be mounted across the air opening. Unit shall bear an engraved aluminum nameplate and shall be shipped in ISTA certified transit tested packaging.
   3. Unit shall be model FGR as manufactured by Greenheck, or equal.

2.11 LOUVERS, AIR CONDITIONING (USE IN CONJUNCTION WITH RELIEF DAMPER)
A. Standard steel louvers shall be furnished complete with frames, blades, finish and construction details per Drawings and manufacturer’s recommendations.

B. Louvers shall be furnished with horizontal blades, 2 inches deep for air through the wall installation in conjunction with backdraft relief damper as indicated on the Drawings. Blades shall be 16-gage steel, spaced at 1-7/8 inches at 30 degrees angle, and with baked epoxy coating. Panel size to be as indicated but not less than 24 inches width x 18 inches in height.

PART 3 - EXECUTION

3.1 GENERAL
A. Examine areas under which Work of this Section will be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 EQUIPMENT FOUNDATIONS
A. Equipment foundations, where indicated, shall be of sufficient size and weight, and of proper design to preclude shifting of equipment under operating conditions, or under any abnormal conditions imposed upon equipment.
B. Foundations shall meet requirements of equipment manufacturer and, when required by the Architect, obtain from equipment manufacturer, approval of foundation design and construction for equipment to be installed. Equipment vibration shall be maintained within design limits, and shall be dampened and isolated. Isolators shall be bolted to a steel member so as to be readily removable.

3.3 EQUIPMENT DESIGN AND INSTALLATION

A. Uniformity: Unless otherwise specified, equipment of same type or classification shall be product of same manufacturer.

B. Application: Only provide equipment as reviewed by the Architect.

C. Equipment Installation: Equipment installation shall be in strict accordance with these Specifications, and installation instructions of manufacturers. Equipment installed on concrete foundations shall be grouted before piping is installed. Piping shall be installed in such a manner as not to place a strain on any of the equipment. Flanged joints shall be adequately extended before installation. Piping shall be graded, anchored, guided and supported, without low pockets.

1. Install equipment in a neat and skillful manner, properly aligned, leveled, and adjusted for satisfactory operation.

2. Install so connecting and disconnecting of piping and accessories can be readily accomplished, parts are readily accessible for inspection, service and repair. Space shall be provided to readily remove filters, coils, compressors and fan wheels. Access doors shall be hinged with cam lock door handles.

3.4 ROOF-TOP EQUIPMENT MOUNTING

A. Downflow Packaged Units: Install unit on a prefabricated mounting frame secured directly to roof. Follow manufacturer's recommended installation manuals. Submit Shop Drawings for review by the Architect.

B. Horizontal Flow Packaged Units: Install unit on platform designed to suit roof conditions and requirements of provided unit. Submit Shop Drawings for review by the Architect.

3.5 NOISE AND VIBRATION

A. Operation of Equipment: Mechanical equipment and piping systems shall operate without exceeding specified noise and/or vibration levels.

B. Corrective Measures: If specified noise and/or vibration levels are exceeded, provide necessary changes to reduce noise and/or vibration levels to within specified levels.

3.6 FLOOR-MOUNTED UNITS

A. Floor-mounted, unducted, unitary units installed in classrooms shall be installed on a wood base with 1/2 inch sound absorbing pad as reviewed by the Architect.

3.7 FIELD TESTS AND INSPECTION

A. General: Perform field inspections, field tests, and trial operations as specified in Section 15010: Basic Mechanical Requirements. Provide labor, equipment and incidentals
required for testing. The IOR will witness field tests and trial operations as specified in Section 15010: Basic Mechanical Requirements.

B. Equipment and Material: Equipment and material certified as being successfully tested by manufacturer, in accordance with referenced Specifications and standards, will not require re-testing before installation. Equipment and materials not tested at the place of manufacture will be tested before or after installation, as applicable or necessary, to determine compliance with referenced Specifications and standards.

C. Start-Up and Operational Test: System shall be started up and initially operated with components operating. During this test, various strainers or filters shall be periodically cleaned until no further accumulation of foreign material occurs. Do not permit excessive loss of water while strainers are being cleaned. Adjust safety and automatic control instruments as required to provide proper operation and control sequence. Refer to Section 15010: Basic Mechanical Requirements.

D. Multi-zone and VAV systems 7-1/2 tons and above, shall be provided with factory start-up.

E. Extent of Field Tests: After installation and before completion, Work of this section shall be subjected to required field tests, including those specified here and in Section 15010: Basic Mechanical Requirements.

F. Operation and Maintenance Data: Provide required operation and maintenance data as specified in Section 15010: Basic Mechanical Requirements.

3.8 REFRIGERANT PIPING

A. Unless otherwise indicated, main liquid and suction lines from condensing unit to evaporator coil shall be of sizes specified by manufacturer.

B. Refrigeration piping shall be refrigeration grade copper tubing, type L hard-drawn. In instances where refrigeration lines are installed in an inaccessible location and must be snaked through conduit or a trench, that portion of tubing required to complete connections through conduit or trench may be soft drawn. Maintain entire system clean and dry during installation. Pipe shall be sealed until installed.

C. Refrigeration lines, both hard- and soft-drawn, shall be straight and free from kinks, restrictions or traps and horizontal runs shall be sloped towards compressor one inch to 10 feet wherever possible.

D. Joints shall be installed with Silfos 15, Silvaloy 15, or equal, high melting point solder.

E. Flare nuts required on suction lines shall be of the short forged or frost-proof type. All other fittings shall be standard sweat-soldered type. Els and return bends shall be long radius type. Install leak lock material.

F. Refrigeration Piping: Joints shall be silver brazed and leak tested. Field fabricated lines shall be thoroughly flushed and cleaned before connection. Bleed nitrogen through lines during silver brazing, and cap and seal lines when not completed and connected to equipment.

G. Sleeve penetrations of floors, walls and ceiling to allow for free motion of piping. Provide 24 gage galvanized iron pipe and chrome-plated escutcheon plates. Pack annular space between pipe and sleeve with incombustible material such as fiberglass and seal each end with mastic to provide a waterproof seal.
H. Install insulated couplings at points of connection between dissimilar metals for cathodic protection. Insulate copper tubing from ferrous materials and hangers with 2-inch thickness of 3-inch wide strip, 10 mil. polyvinyl tape wrapped around pipe.

I. Support piping by iron hangers and supports, per manufacturer's recommendations. Provide saddles to protect pipe insulation.

J. Provide connections of copper and brass pipe and tubing with 95-5 tin/antimony, ASTM B 32, Grade 5A solder.

K. Insulate refrigerant suction lines.

L. On split air conditioning systems, insulate both suction and liquid lines. For insulation materials, refer to Section 15080: Mechanical Insulation.

3.9 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.10 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION
SECTION 15800

AIR DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes: Provide ductwork and appurtenances required for a complete air transmission and distribution system for the heating, ventilating, and air conditioning systems indicated on Drawings and as specified.

C. Related Sections:

1. Section 09900: Paints and Coatings.

2. Section 15010: Basic Mechanical Requirements.

3. Section 15050: Basic Mechanical Materials and Methods.

4. Section 15070: Mechanical Sound, Vibration and Seismic Control.

5. Section 15080: Mechanical Insulation.


7. Section 15900: HVAC Instrumentation and Controls.

1.2 SUBMITTALS

A. Provide in accordance with Division 01 and Section 15010: Basic Mechanical Requirements.

B. Manufacturer's Data:

1. Complete list of items to be furnished and installed under this section. Material lists that do not require performance data shall include manufacturer names, types and model numbers.

2. Manufacturer's specifications and other data required to demonstrate compliance with specified requirements.

3. Literature shall include descriptions of equipment, types, models, sizes, capacity tables or curves marked to indicate performance characteristics, electrical requirements, options selected, space requirements (including allowances for servicing) and other data necessary to ensure compliance with requirements of these Specifications and performances indicated on Drawings. Data shall also include name and address of nearest service and maintenance organization that regularly stocks repair parts. Listings of items that function as parts of an integrated system shall be furnished at one time.
4. Shop Drawings: Shop Drawings indicating methods of installation of equipment and materials, sizes and gages of ducts, and details of supports. Items to be covered shall include but not be limited to following:
   a. Layout of ductwork and equipment drawn to scale to establish that equipment will fit into allotted spaces with clearance for installation and maintenance. Indicate proposed details for attachment, anchoring to, and hanging from structural framing of building. Indicate vibration isolation units, foundations, supports, and openings for passage of pipes and ducts.
   b. Drawings indicating locations and sizes of sleeves and prepared openings for pipes and ducts.
   c. Typical details of supports for equipment and ductwork.

1.3 QUALITY ASSURANCE

A. Installer's and Manufacturer's Qualifications: Comply with provisions stated under Section 15010: Basic Mechanical Requirements.

1.4 PRODUCT HANDLING

A. Protection, Replacements, Delivery and Storage: Comply with provisions stated in Section 15010: Basic Mechanical Requirements.

1.5 COORDINATION

A. Coordinate activities in accordance with provisions of Section 15010: Basic Mechanical Requirements.

PART 2 - PRODUCTS

2.1 GENERAL

A. Unless otherwise noted, provisions, including amendments thereto, of the HVAC Duct Construction Standards of Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) and the California Mechanical Code (CMC), are hereby made part of this section.

B. Rectangular, round and flat oval ducts shall be manufactured and installed in accordance with requirements of the HVAC Duct Construction Standards of SMACNA.

C. Sheet metal ducts shall be fabricated from galvanized steel, aluminum or stainless steel.

D. Galvanized steel ducts shall be fabricated of galvanized steel sheet, lock forming grade, conforming to ASTM A 525 and A 527.

E. Galvanized steel ducts gage thickness and permissible joints and seams shall conform to requirements in Table 2, Minimum Metal Gages, of this section.

F. Ducts shall be reinforced in accordance with SMACNA standards.

   1. Cross-broken Duct: Duct sizes 19 inches wide and larger which have more than 10 square feet of unbraced panel shall be beaded or cross-broken. This requirement
is applicable to 20 gage or less thickness and 3 inches w.g. or less pressure. For
details, refer to SMACNA manual.

G. Round, Oval and Flexible Duct for Galvanized Steel Ducts:

1. Round Spiral Ducts and Fittings: Fabricated from galvanized sheet steel shall be
   machine-formed spiral pipe with sealed spiral locking joints. Fittings shall be
   furnished with continuous corrosion-resistant welds. Ducts and fittings shall be as
   manufactured by United Sheet Metal, or equal. Provide gages of ducts and fittings
   recommended by manufacturer.

2. Details of seams and transverse joints for round duct and fittings shall conform to
   SMACNA standards.

3. Flat oval ducts shall be provided as indicated on the Drawings. Reference standard
details in SMACNA manual.

4. Minimum duct wall thickness for flat oval duct construction shall be as indicated in
   SMACNA manual.

5. Non-metallic flexible duct for T-bar suspended ceiling may be provided upon review
   of the Architect, after submittal of installation, bench details and certified test data in
   accordance with the Air Diffusion Council Test Code FD-72. Flexible duct shall be
   rated for not less than 6 inches w.g. static pressure.

6. Flexible duct shall be non-metallic, insulated for conditioned air supply and return.
The flexible ducts shall be factory fabricated with exterior reinforced laminated
   vapor barrier, 1-1/2 inch thick fiber glass insulation (K=0.25 @ 75 degrees F.),
   encapsulated zinc-coated spring steel wire helix and impervious, smooth, non-
   perforated interior vinyl liner and factory fabricated steel connection collars. For the
   composite assembly, including insulation and vapor barrier, comply with NFPA
   Standard 90 A or 90 B and tested in accordance with UL Standard, UL-181. Non-
   insulated metallic ducts shall be provided for exhaust only.

7. Methods of installations, standards for joining and attaching, and supporting flexible
duct shall conform to applicable provisions of SMACNA manual.

8. These provisions apply for ducts furnished for indoor comfort heating, ventilating
   and air conditioning service only.

9. Specifications herein shall not supersede installation requirements by flexible duct
   manufacturer if those are more stringent.

H. Fittings and Other Construction Details: Details of fittings such as elbows, turning vanes,
   branch take-off and connections, duct access doors, connections for grilles, registers and
   ceiling diffusers, flexible connector at fan, etc., shall conform to applicable provisions of this
   section or SMACNA manual.

I. Duct Seam and Joint Sealant: Furnish duct seam and joint sealant or tape for metal ducts.
   Sealant for low-pressure ducts shall be 3M Company Miracle D17, or equal, for installation
   with a caulking gun. Provide tape joints with canvas with Borden Chemical Division Arabol
   adhesive, or equal. Provide sealing material for medium-pressure ducts as described in the
   SMACNA manual for those pressures.
2.2 ACOUSTICAL DUCT AND PLENUM LINERS

A. Duct liners shall conform to requirements of Section 15080: Mechanical Insulation.

2.3 DAMPERS

A. Manually Operated Volume Control Dampers:

1. VD-1, Rectangular: Multi-blade type, opposed blade operation, 16 gage galvanized steel blades; center pivoted on 3/8 inch diameter steel trunnions; interlocking edges; dampers shall be in own angle frame, full duct size as indicated on Drawings; frame of minimum 16 gage steel channel construction. Provide with damper operator and axles positively locked to blade. Ruskin MD 35, or equal.

2. VD-2, Round: Frame shall be constructed of not less than 16 gage galvanized steel, blades of not less than 16 gage galvanized steel channel construction with factory neoprene seals, 1/2 inch diameter axle shafts and locking hand quadrant. Ruskin CDR S25, or equal.

3. VD-3, Oval: Frame shall be constructed of not less than 14 gage galvanized steel channels with factory blade seals of not less than 12 gage galvanized steel with not less than 1/2 inch diameter axle shafts. Provide Ruskin standard construction for frame, blade and axle size, thickness and material variation. Provide adjustable locking hand quadrant. Ruskin CDO 25, or equal.

B. Motorized Volume Control Dampers:

1. MVD-1, Rectangular: Multi-blade type opposed blade operation, 16-gage minimum steel channel frame construction; 16-gage galvanized steel blades center pivoted on 1/2 inch diameter steel trunnions. Interlocking edges. Dampers shall be in own angle frame. Full duct size as indicated on the Drawings. Provide with matching 2-position motorized actuator with linkages, 120 VAC by Barber-Colman, Honeywell, or equal. Ruskin, Damer CD35, or Pottorff.

2. MVD-2, Round: Butterfly type constructed with minimum 18 gage galvanized steel frame with steel angle reinforcement on above 20 inches diameter. Blade 2-layer, minimum 14-gage equivalent thickness. Neoprene seal to ensure air tightness in closed position. Furnish with matching 2-position motorized actuator with linkage 120 VAC by Barber-Colman, Honeywell, or equal.

C. Automatic Fire Dampers:

1. FD, Fire Dampers: Shall conform to requirements of and be listed by State of California Fire Marshal and NBFU Pamphlet 90A. Dampers shall provide airflow resistance not to exceed 0.05 inch water gage static pressure at 900 fpm or 0.25 inch water gauge at 2000 fpm. Dampers shall be installed in required steel sleeve at each penetration of a rated partition.

a. Vertical-mounted fire dampers: Fire damper shall be curtain type with blades removed from the air stream to allow for maximum free area. Dampers will be provided in factory sleeves as tested and listed by manufacturer. Dampers shall be rated for 1-1/2 hours for installation in one or 2-hour partitions. Provide UL listed fusible links of adequate size and temperature rating. Dampers will be installed according to the
manufacturer's recommended installation instructions provided with units. Provide suitable access for inspection and servicing of each damper. Pottorff Model VFD-10 ISB (CSFM No. 3225-368:101), Ruskin, or equal.

b. Ceiling fire dampers: Ceiling fire dampers shall be butterfly type with ceramic material to minimize heat radiation. Dampers shall be rated for one hour and shall be furnished as a part of an integral sleeve ceiling box that will accept air distribution, have a UL listed and pre-mounted hanger tabs. Dampers shall be installed according to the manufacturers recommended installation instructions. Pottorff Model CFD-15 ES (CSFM No. 3225-368:104), Ruskin, or equal.

c. Combination fire and smoke dampers: Combination fire and smoke dampers shall be louver bladed type. Units shall be tested and listed under UL 555 and UL 555S. Rating 1-1/2 hours for installation in one or 2-hour partitions. The seals shall be non-degradable steel to steel. Leakage shall not exceed 15 cfm/sq. ft. at one inch w.g. and shall be tested at 850 degrees F. Dampers shall be capable of being remotely controlled and reset for pressurization and smoke evacuation. Fire-releasing device shall be UL 33 listed melting fusible links. Dampers shall be provided in sleeves with pre-mounted non-stall motor actuators and dual-position indicators for remote annunciation, if required. The complete assembly shall be factory cycled and tested prior to shipment. Provide suitable access for inspection and servicing of each damper. Pottorff Model FSD142 (CSFM No. 3225-368:110) with non-stall motor, or Ruskin Model FSD 35, FSD60 (CSFM No. 3225-245:005, 102) with electric fuse link Model EFL 200, with electric non-stall motor, or equal.

D. Relief Dampers: Parallel multi-blade type. Constructed of 20 gage galvanized sheet steel or aluminum alloy with solid stops all around. Bearings shall be self-lubricated type. Damper shall open on a positive pressure within space and close to a backdraft. Interlocking edges shall prevent dust infiltration when closed. Air Balance, Pottorff, Ruskin or Metal Form.

E. Duct Access Panels: Provide factory fabricated access panels in ducts where required for servicing fire or smoke dampers, and at other locations as specified in this section. Units shall consist of removable panel, gasketed and pressure sealed by controlled spring tension locks. Construct unit, including interior parts, of same material as duct. Units shall be constructed to be suitable for installation in systems of up to 5 inches water gauge static pressure.

2.4 AIR DISTRIBUTION DEVICES

A. General:

1. Grilles, registers, diffusers and appurtenances shall conform to requirements specified herein and shall be of type and sizes as specified and indicated on Drawings. Performance shall be in accordance with Air Diffusion Council Test Code 1602R2 including airflow velocity, pressure, temperature, and sound measurements.

2. Sponge neoprene, rubber, vinyl or felt border gaskets shall be provided for surface-mounted registers, grilles or diffusers.
3. Maximum sound level for supply diffusers and return and exhaust grilles shall not exceed NC 35.

4. Ceiling diffusers shall be provided with equalizing deflectors. Barber-Colman Defлектor, Anemostat Model ED, Tuttle, or Bailey M-6.

5. Ceiling mounted grilles, registers and diffusers shall be provided with a factory applied, baked enamel, dull finish, bone white to match acoustical ceiling tile.

6. Grilles or registers mounted on painted walls or other surfaces shall be furnished with a baked prime coat and finish painted in accordance with Section 09900: Paints and Coatings.

7. Ceiling diffusers return grilles with duct connections, and exhaust grilles shall be provided with loose key-operated opposed blade volume control. Volume controls for return grilles without duct connections are not required.

B. Ceiling Diffusers - Round, Square, Rectangular:

1. CD-1: Acoustical Tile on Plaster Ceilings or Exposed Ceilings: Units shall be square or rectangular modular core type flush and flanged for surface mounting. Anemostat Type RMD-S, or equal.

2. CD-2: Prefabricated Acoustical Tile Ceilings with Inverted Exposed T-Bars: Units shall be square or rectangular modular core lay-in, flush panel type with a nominal overall dimension of 24 inches x 24 inches. Anemostat Type RMD-FP, or equal.

3. CD-3: Units shall be round, adjustable pattern, surface-mounted type. Anemostat Type C-27, or equal.

C. Ceiling Grilles - Return, Exhaust, Round, Square, Rectangular:

1. RG-1, EG-1: Acoustical Tile on Plaster Ceiling: Return and exhaust grilles shall be single deflection type with horizontal fixed face bars set at straight or 45 degree angle and flush and flanged for surface mounting. Anemostat Type S3HD, or equal.

2. RG-2, EG-2: Prefabricated Acoustical Tile Ceiling with Inverted Exposed T-Bars: Return and exhaust grilles shall be with single deflection horizontal fixed face bars, set at straight or 45 degree angle flush, lay-in panel type with nominal overall dimension of 24 inches x 24 inches. Anemostat Type SAC3LD, or equal.

3. RG-3, EG-3: Units shall be round, adjustable pattern, surface-mounted type. Anemostat Type C-27, or equal.

D. Wall Registers - Supply, Return, Exhaust:

1. WR-1: Sidewall supply register shall be double deflecting type with loose key-operated opposed blade volume control. Anemostat Type S2HO, or equal.

2. WR-2: Sidewall return register shall be single deflecting type with horizontal fixed face bars set at 45 degree angle flush and flanged for surface mounting and complete with loose key-operated opposed blade volume control. Anemostat Type S3HOD, or equal.
E. Linear Supply Diffusers:

1. LD-1: Linear supply plenum-slot diffusers shall be provided in nominal lengths of 2', 3', 4', or 5' lengths, and have 1 to 4 slots as scheduled for the performance requirements as shown on the floor plans.

2. Diffusers shall be constructed of steel. Unpainted surfaces shall be zinc coated. The supply diffuser assembly shall consist of a fixed pattern diffuser, integral with a supply air plenum, with an inlet collar of the size as shown.

3. Finish shall be white (or color as scheduled or selected by the Architect) on all exposed surfaces.

4. Provide surface mounting frames where used with hard surface ceiling systems or walls. Provide field mounted inlet balancing dampers as scheduled. Plenums shall be insulated with (1/2" internal insulation) (1/2" external foil-faced insulation) (1/2" internal foil-faced insulation). Anemostat Type SLSD or equal.

2.5 SOUND ATTENUATING EQUIPMENT - DUCT SILENCERS

A. Provide factory fabricated duct silencers of tubular or rectangular type, for high or low velocity service, with arrangements, sizes and capacities as indicated on Drawings. Construct silencers of galvanized steel with casing seams sealed or welded to be airtight at a pressure differential of 8 inches water gauge between inside and outside of unit, and stiffen or brace as required to prevent structural failure or deformation at same condition, or audible vibration during normal operation. Furnish an inert acoustical absorbing filler material or inorganic mineral or fibrous glass that is vermin, moisture-proof, and will impart no odor into air stream. Filler material shall have fire hazard classification values, when tested in accordance with ASTM E 84, NFPA 255, or UL 723, not exceeding the following:

1. Flame Spread: 15

2. Fuel Contribution: 0

3. Smoke Development: 0

B. Select and provide silencers from acoustical and aerodynamic rating tables based on actual test readings or interpolated values of such readings obtained from tests made by recognized independent laboratories. Tests shall be in accordance with ASTM E 477.

C. Select and provide silencers for air pressure drops not exceeding those indicated on Drawings, and of types, sizes and models for which noise reduction values, dynamic insertion loss, in decibels reference 10-12 watts, are not less than indicated on Drawings.

2.6 SMOKE DETECTORS

A. Refer to Division 16: Fire Alarm Systems
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which Work of this section will be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 DUCTWORK

A. Construct ductwork according to details of fabrication and methods of support, as indicated in the SMACNA manuals and CMC, unless specified or indicated otherwise in this section or on Drawings. In event of conflict, the most stringent requirement shall be provided.

B. Unless otherwise required, construct ducts to conform accurately to dimensions indicated and to be straight and smooth on inside, with joints neatly finished.

C. Duct dimensions indicated are net inside dimensions. If the indicated duct is to be furnished with an acoustic lining, add twice the thickness of the acoustic liner in both the duct width and height dimensions to provide the gross sheet metal duct dimensions.

D. Where aluminum is welded, provide aluminum with thickness of minimum 16 gage, and metallic arc or acetylene process of welding.

E. Anchor ducts to building structural slab, framing and roof decking and detail method of anchoring and fastening if not indicated on Drawings. Supports shall be seismically constructed.

F. Construct and install ducts to be completely free from vibration under operating conditions.

G. Indicate on layout drawing, required for suspended ductwork, location of supports, loads imposed on each fastening or anchor, typical details for anchorage, and details for special anchorage for supports attached to metal roof decking.

H. Attach supports only to building structural framing members and concrete slabs.

I. Where supports are required between structural framing members, detail and install suitable intermediate metal framing.

J. Ducts transporting air-conditioned or heated supply air shall be insulated in accordance with requirements of Section 15080: Mechanical Insulation.

1. Ducts exposed to weather shall be furnished with exterior insulation with weather jacket and interior lining as indicated on Table 2, Section 15080: Mechanical Insulation.

K. Ferrous angles and structural members and joining collars specified for construction and support of ductwork and plenums shall be primed with one heavy coat of required asphaltic aluminum paint before installation or fabrication. Metal surfaces shall be thoroughly cleaned before installation of paint. Galvanizing may be provided instead of painting. Installed duct hanger rods concealed in furred ceilings and walls are not required to be primed or painted.

L. Broken places in galvanized coating shall be acid washed and then completely soldered over or painted with galvanizing paint, Devcon Z or ZRC cold galvanizing compound.
3.3 **DUCT CONSTRUCTION**

A. Minimum ductwork gages, joints, reinforcing, and bracing shall conform to the following tables. Hoods, plenums, and castings shall not be lighter than the duct gage listed in Table 2 for corresponding dimensions. Additional bracing shall be provided to prevent objectionable panel vibration.

B. Provide longitudinal seams of the grooved snap lock and standing, sealed and taped, or sealed spiral or continuously welded. For exhaust duct, taping may be omitted.

**TABLE 1 - SHEET METAL THICKNESS FOR CIRCULAR DUCTS AND FLAT-OVAL (FOR STATIC PRESSURES LISTED)**

<table>
<thead>
<tr>
<th>Gage Thickness</th>
<th>Diameter of Duct</th>
<th>Horizontal Girth</th>
<th>Joints</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot; Water Column Maximum S.P. Round / Oval</td>
<td>Diameter Support</td>
<td>Maximum Distance</td>
<td></td>
</tr>
<tr>
<td>26 / 24</td>
<td>Up to 9&quot;</td>
<td>10'</td>
<td>2&quot; slip</td>
</tr>
<tr>
<td>26 / 24</td>
<td>9&quot; - 14&quot;</td>
<td>8'</td>
<td>4&quot;</td>
</tr>
<tr>
<td>24 / 22</td>
<td>14&quot; - 23&quot;</td>
<td>8'</td>
<td>4&quot;</td>
</tr>
<tr>
<td>22 / 20</td>
<td>23&quot; - 37&quot;</td>
<td>8'</td>
<td>4&quot;</td>
</tr>
<tr>
<td>20 / 18</td>
<td>37&quot; - 51&quot;</td>
<td>6'</td>
<td>1-1/4&quot; x 1-1/8&quot; flange</td>
</tr>
</tbody>
</table>

C. Construction Details for Rectangular Sheet Metal Ducts for Low-Pressure Systems - Velocities not Exceeding 2,000 Feet Per Minute:

1. For pressures in excess of 2 inches water column, duct wall thickness shall be 2 gages heavier than set forth in this table.

2. Duct specifications shown below are applicable when ducts larger than 18 inches are cross-broken. Where cross breaking is not provided, duct wall thickness shall be 2 gages heavier on ducts 19 inches to 60 inches wide unless longitudinal standing seams are furnished.

**TABLE 2 - MINIMUM METAL GAGES**

<table>
<thead>
<tr>
<th>Minimum Gage Thickness</th>
<th>Max. Side, Gross Steel Maximum</th>
<th>Duct Permissible Girth</th>
<th>Horizontal Support Joints &amp; Longitudinal Seams</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dimensions</td>
<td></td>
<td>Distance</td>
</tr>
<tr>
<td>26</td>
<td>Up to 12&quot;</td>
<td>Drive-slip, plain S-slip, or 1&quot; pocket lock</td>
<td>10'</td>
</tr>
<tr>
<td>24</td>
<td>13&quot; - 18&quot;</td>
<td>Drive-slip, plain S-slip, 1&quot; pocket lock</td>
<td>10'</td>
</tr>
<tr>
<td>Steel</td>
<td>Dimension</td>
<td>Duct Permissible Girth</td>
<td>Horizontal Support</td>
</tr>
<tr>
<td>-------</td>
<td>-----------</td>
<td>------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>24</td>
<td>19&quot; - 30&quot;</td>
<td>Hemmed S-slip, 1&quot; bar slip, or 1&quot; pocket lock on 5&quot; centers.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hemmed S-slip, 1&quot; slip, or 1&quot; pocket lock on 5&quot; centers with 1&quot; x 1&quot; x 1/8&quot; angles on center line between.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hemmed S-slip, 1&quot; bar slip, or 1&quot; pocket lock on 10&quot; centers with cross break 1&quot; standing seam on 5&quot; centers.</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>31&quot; - 42&quot;</td>
<td>1&quot; bar slip, reinforced bar slip, or pocket lock 5&quot; centers.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1&quot; bar slip, reinforced bar slip, or pocket lock on 10&quot; centers with 1&quot; x 1&quot; x 1/8&quot; angles on center line between.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1&quot; standing seam on 5&quot; centers inside longitudinal standing seams with 1&quot;x 1&quot; x 1/8&quot; angles on 5&quot; centers on exterior.</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>43&quot; - 54&quot;</td>
<td>1-1/2&quot; bar slip, reinforced bar slip, or pocket lock on 4&quot; centers.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-1/2&quot; bar slip, reinforced bar slip, or pocket lock on 8&quot; centers with 1-1/2&quot; x 1-1/2&quot; x 1/8&quot; angles on center line between.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-1/2&quot; bar slip, reinforced bar slip, or pocket lock on 4&quot; centers with cross break.</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>55&quot; - 60&quot;</td>
<td>1-1/2&quot; standing seam on 3&quot; centers inside longitudinal standing seam with 1-1/2&quot; x 1-1/2&quot; x 1/8&quot; angles on 4&quot; centers on exterior.</td>
<td></td>
</tr>
</tbody>
</table>
20* 61" - 84"  
Reinforced bar slip, angle slip, 6'
alternate bar slip, or angle
reinforced pocket lock on 4'
centers using 1-1/2" x 1-1/2"
1/8" 1-1/2" x 1/8" angles on
centerline between reinforced
bar slip, angle slip, alternate
bar slip or angle reinforced
pocket lock on 8' centers using
1-1/2" x 1-1/2" x 1-1/2" x 1/8" reinforcing
angles 2' on centers in-between 1-1/2"
angle reinforced standing seam on
2' center using 1-1/2" x 1-1/2" x
1/8" reinforcing angles. Inside
longitudinal standing seams with
1-1/2" x 1-1/2" 1/8" angles on
2' centers on exterior.

* Button punch snap-lock seams, Lockformer, or equal, shall only be permitted on 20 and 22 gage
  galvanized steel ducts.

D. Ferrous angles and structural members and joining collars specified for the construction and
  support of ductwork and plenums shall be primed with one heavy coat of asphalt aluminum
  paint before installation or fabrication. The metal surface shall be thoroughly cleaned before
  application of the paint. Galvanizing may be provided instead of painting. Installed duct
  hanger rods concealed in furred ceilings and walls is not required to be primed or painted.

E. Broken places in galvanized coating shall be acid washed and then completely soldered
  over or painted with galvanizing paint, Devcon Z or ZRC cold galvanizing compound.

F. S-type or drive-slip type girths or longitudinal seams shall not be furnished for ductwork
  installed outdoors or mounted on roofs. Provide angle-reinforced government lock only.

G. Broken places in galvanized coating shall be acid washed and then completely soldered
  over or painted with galvanizing paint, Devcon Z or ZRC cold galvanizing compound.

3.4 DUCTS AND PLENUMS WITH LINERS

A. Ducts and plenums lined with acoustical insulation shall be as indicated on Drawings.

B. Duct dimensions indicated on Drawings are net. Add thickness of acoustic liners to obtain
  gross sheet metal duct dimensions.

C. For duct liner Specifications and installation, refer to Section 15080: Mechanical Insulation.

3.5 DUCT ELBOWS AND TURNING VANES

A. Duct elbows, including supply, exhaust, and return, shall be provided with a centerline radius
  of 1.5 times duct width parallel to radius whenever possible; centerline radius shall not be
  less than width of duct parallel to radius.

B. Where space does not permit above radius, or where square elbows are indicated on
  Drawings, turning vanes shall be installed whether indicated on Drawings or not.
C. Turning vanes shall be thick double-wall vane type, Titus Y or Z, Tuttle and Bailey Ducturn, or equal. Duro-Dyne vane rail system duct turns may be furnished, provided they are of thick double wall type and Shop Drawings are submitted and reviewed by the Architect. Duct turning vanes shall be of same material as ductwork and shall be rigidly fastened in ductwork.

3.6 DUCT JOINTS AND SEAMS

A. Conditioned air supply ducts shall be furnished with joints and seams taped for air tightness or welded, except spiral seam factory machine formed duct components. Spiral seam is exempted. Joints between slip-fit components may be assembled with all seams and joint connections fastened with screws and taped.

B. Other ducts shall be furnished with joints and seams sealed by caulking, taping, soldering, or welding.

C. S-slip or drive-slip type girths or longitudinal seams are not permitted on exterior or exposed rooftop mounted ductwork. Provide angle-reinforced government lock only.

D. Caulking, taping, or other joint or seam treatment shall be provided in accordance with recognized standards.

E. Unless otherwise detailed, taping shall be with Duro-Dyne FT-2, 2-inch wide tape, installed over S-2 duct sealer or Arabol and canvas tape or listed Miracle tape. Ducts shall not be covered or insulated on outside until joints are inspected by the IOR. A second coat of Arabol or adhesive shall be installed 24 hours after initial application if separation occurs. Provide only approved and UL or Factory Mutual listed material for sealing and caulking.

F. Seams around fan, coil housing and plenums shall be sealed with gaskets or caulking compound to provide an airtight assembly.

G. Duro-Dyne S-2, or equal, as recommended and guaranteed by manufacturer for this specific application, shall be installed in accordance with manufacturer's recommendations. Metal surfaces shall be thoroughly cleaned before installing caulking compound. Galvanized surfaces shall be etched, if necessary, to obtain a bond between metal and caulking compound.

3.7 DUCT TRANSITION

A. Slopes in sides of transition pieces shall be no greater than 1 to 5. Abrupt changes or offsets in duct system are not permitted, except when reviewed by the Architect.

3.8 DUCT TEST HOLES

A. Holes in ducts and plenums shall be provided for pilot or static tubes for obtaining air measurements to balance or check air systems. Holes shall be covered with neoprene gasketed sheet metal cover or plugged with a fitted neoprene plug chained to duct.

3.9 SOUND ATTENUATING EQUIPMENT

A. Install sound attenuators where required and indicated on Drawings. Refer to manufacturer's instructions for required installation.
3.10 FLEXIBLE CONNECTIONS

A. At points where sheet metal connections are installed to fans or air handling units, or where ducts of dissimilar metals are connected, a flexible connection of commercial grade, Duralon by Duro-Dyne Corporation, or equal, non-combustible material shall be installed and securely fastened by zinc-coated steel clinch-type bands or a flange type connection. Inlet and outlet openings shall be axially in-line, maximum deviation of centerline shall be less than 5 percent of diameter or shortest dimension of a rectangular inlet of fan or air handling unit, with system at rest. Duct end of connection shall be seismically restrained if more than 4 feet from last support.

3.11 AIR TERMINAL DEVICES

A. General:

1. Install supply devices after ducts, plenums, and casings have been cleaned and blown free of small particles, as specified. Devices shall be aligned to be parallel to ceiling construction or walls and ceiling surfaces, and shall be pulled tightly to compress gaskets and to fit neatly against surfaces.

B. Diffusers: Support surface mounted ceiling diffusers from angles or channels resting on and fastened to ceiling construction. Do not support from ducts. Install lay-in diffusers on T-bar ceilings supported by ceiling structure. Provide sheet metal adaptor box above each diffuser to allow space for volume controller with round collars for connection to round ducts where indicated on Drawings. Fasten duct-mounted diffusers to duct collars.

C. Registers and Grilles:

1. Install wall supply registers at least 6 inches below ceiling, unless otherwise indicated. Locate return and exhaust registers 6 inches below ceiling unless otherwise indicated.

2. Support ceiling diffuser type inlets, registers, and grilles as required above for ceiling diffusers.

3. Fasten wall mounted and duct mounted registers and grilles to flanges of duct collars.

3.12 DAMPERS

A. Manually operated dampers, gravity dampers, fire dampers, and motor operated dampers shall be furnished and installed as specified and indicated. Upon completion of installation, dampers shall be checked, lubricated, and adjusted so that they operate freely, without binding. Dampers shall be of standard commercial manufacture, complete with damper frame. Where painting is required, they shall be shop finished unless otherwise noted.

1. Balancing dampers shall be installed in main supply ducts from fan discharge plenums, where 2 or more ducts are connected to each plenum, although such balancing dampers may not be indicated. Each zone shall be provided with a manual volume damper. Sheet metal screws shall be installed through handles and into ducts to lock damper in place after test and balance.
2. Supply, return, and exhaust branches shall be provided with manual volume dampers.

3. Dampers installed in accessible locations shall be provided with locking and indicating quadrants. Ventlock, Duro-Dyne, or equal.

4. Dampers installed in ductwork in furred ceiling spaces or in roof spaces with less than 30 inches of clearance below beams, joists, or other construction, and where access panels are not provided shall be furnished with damper rods extended below ceiling and terminated with a concealed damper regulation. Ventlock, Young, or equal.

5. Dampers not identified as splitter, extractor, or butterfly dampers shall be of multi-louver type arranged for opposed blade operation. Damper shall be same dimension as adjoining duct and be tight closing. Blades shall be not greater than 4 inches. Dampers shall be not less than 20 gage steel. Teflon, or equal.

6. Motor operated dampers shall be furnished by temperature control manufacturer as part of temperature control equipment and shall conform to requirements of Section 15900: HVAC Instrumentation and Controls.

7. Dampers shall be provided with accessible operating mechanisms. Where operators are exposed in finished portions of building, operators shall be chromium-plated with exposed edges rounded. Splitter dampers are not permitted unless specified and reviewed by the Architect.

8. Dampers shall not be installed in combustion air ducts.

9. Access panels shall be installed for access at each damper's operating mechanism.

3.13 FIRE AND SMOKE DAMPERS

A. Fire dampers or combination fire and smoke dampers shall be installed and accessible at duct penetrations of rated walls and partitions and as required by State Fire Marshal and NFPA 90A.

B. Fire dampers shall be sized, and adjoining duct enlarged, to assure full size air passage of connecting ductwork.

C. Install smoke dampers as indicated on Drawings and as required in ducts penetrating smoke isolation separations.

D. Fire dampers or combination fire and smoke dampers shall be electrically actuated, power open-fail close type, and UL 555 classified for 1-1/2 hours.

3.14 SMOKE DETECTORS

A. Smoke detectors shall be installed in accordance with requirements of the Uniform Mechanical Code.

B. Smoke detectors shall be installed in systems of over 2000 CFM capacity to detect presence of smoke and automatically shut down air handling units or fans.

C. Smoke detectors shall be installed in supply system downstream of filters.
3.15 BACKDRAFT DAMPERS

A. Backdraft dampers shall be installed at locations indicated in accordance with the State of California Energy Conservation Standards, Title 24, CCR.

3.16 DUCT SLEEVES AND PREPARED OPENINGS

A. Furnish duct sleeves for 15-inch diameter ducts or less passing through floors, walls, ceilings, or roof and install during construction of the floor, wall, ceiling, or roof. Install round ducts larger than 15 inches diameter and square and rectangular ducts passing through floors, walls, ceilings or roof through prepared openings. Provide duct sleeves and prepared openings for duct mains and duct branches.

B. Provide one inch clearance between duct and sleeve or between insulation and sleeves for insulated ducts, except at grilles, registers and diffusers.

C. Provide prepared openings for round ducts larger than 15 inches in diameter and for square and rectangular ducts with one inch clearance between duct and openings or between insulation and opening for insulated ducts, except at grilles, registers and diffusers.

D. Provide closure collar of galvanized sheet metal not less than 4 inches wide unless otherwise indicated on Drawings on each side of walls or floors where sleeves or prepared openings are provided except where grilles or diffusers are installed. Install collar tight against surface. Fit sharp edges of collar installed around insulated duct to preclude tearing or puncturing insulation covering vapor barrier. Fabricate collars from round ducts in steel. Provide not less than 4 nails to attach collar where openings are 12 inches in diameter and not less than 8 nails where openings are 20 inches in diameter or less.

E. Pack space between sleeve or opening and duct or duct insulation with commercial grade packing yarn.

3.17 FLEXIBLE DUCT RUNOUTS

A. Runouts from branches, risers or mains to air terminal units and outlets may be pre-insulated, factory fabricated flexible ducts complying with NFPA No. 90A. Flexible ductwork shall not exceed 7 feet in length. When required to suspend flexible ducts, furnish hangers of type recommended by manufacturers of pre-insulated flexible duct and install at intervals recommended. Method of attachment to other components of air distribution system for a vapor-tight joint shall be in accordance with printed instructions of flexible duct manufacturer. Bend radius shall be 1-1/2 times diameter of duct, measured from centerline. Bends greater than 90-degree angle are not permitted. Non-metallic flexible duct shall be permitted only in T-bar suspended ceilings.

3.18 DUCT HANGERS AND SUPPORTS

A. Single horizontal ducts shall be suspended from heavy steel hanger straps securely fastened to overhead structural members. Ducts shall be supported by a hanger strap passing around and fastened to duct with not less than 2 Parker No. 10 screws set approximately 2 inches in from each edge, to form a supporting stirrup attached to overhead supports. Rectangular ducts shall be provided with 2 hanger straps, one located on each side of duct. Round ducts may be installed from a single hanger strap unless conditions require that duct be held tight against ceiling, in which case 2 hanger straps may be brought down each side of duct, oriented at right angles to axis of duct and securely fastened to duct
standing leg seam or angle iron stiffener with a minimum of 2 bolts, measuring 1/4 inch, for each side of duct. Hanger straps shall be galvanized with a minimum size of 1-1/8 inches x 14 gage. Angles of galvanized steel of 1-1/8 inches x 1-1/8 inches x 16 gage (14 gage for ducts 60 inches or greater) may be furnished instead of straps.

B. Where ducts are installed one above the other, they shall be individually supported on a trapeze of steel angles with 3/8 inch supporting steel rods securely fastened to overhead construction. A minimum distance of 3 inches shall be maintained between ducts wherever possible, but in no event shall distance be less than 2 inches. Minimum sizes of steel angles shall be 1-1/2 inches x 1-1/2 inches x 1/8 inch for duct sizes through 60 inches in greatest dimension, 2 inches x 2 inches x 1/8 inch for duct sizes 61 inches through 84 inches, 2 inches x 2 inches x 3/16 inch for duct sizes 86 inches through 96 inches, and 2 inches x 2 inches x 1/4 inch for duct sizes over 97 inches.

C. Ducts 30 inches square area and greater and ducts 20 feet long and longer shall be seismically restrained. Refer to Section 15070: Mechanical Sound, Vibration and Seismic Control.

D. Hangers shall not be supported by, or fastened to, non-structural members including blocking. Toggle or Molly type bolts are not permitted.

E. Vertical ducts shall be supported with suitable angles on each side of each duct located at each floor and at intervals not to exceed 8 feet. Angles shall be sized for required span so that they will be rigid, without bending or sagging.

F. Roof-mounted ductwork shall be installed a minimum 12 inches above roof or as indicated on drawings and shall be supported by galvanized welded pipe, one on each side, and fastened to roof in pitch pan filled cold process cement. Install supports at each turn, unit connections, and each penetration, and space at maximum 6 feet off-center in general.

3.19 ACCESS PLATES AND DOORS

A. Access plates and doors shall be furnished and installed where stops, valves, fire dampers, fusible links, coils, damper operating mechanism, control equipment, lubrication fittings, air filters, air handling equipment and similar items normally requiring adjustment or servicing are installed in concealed spaces.

B. Access plates and doors shall be located to permit convenient access to equipment sized to permit removal of equipment for servicing. Access plates shall be no less than 12 inches x 12 inches in clear opening. Proper servicing of equipment requires adequate access for maintenance personnel. Access doors shall not be less than 24 inches x 24 inches, unless otherwise detailed. Two or more valves shall not be located in same access area unless sufficient clearance is provided for operation, servicing and removal of each valve.

C. Openings in ducts or plenums whose longer dimension does not exceed 12 inches may be covered by a plate of same material as duct, gasketed and fastened to duct or plenum with sheet metal screws.

D. Access plates in floors shall not be less than 8 inches x 8 inches and shall be carborundum surface brass with cast brass frames anchored into concrete. Access plates in tile walls shall be chromium plated brass and polished. Approved serrated plates furnished as part of a clean-out assembly are permitted in floors instead of a separate plate.
E. Access plates and doors in walls and ceilings of finished rooms and in locations normally accessible to students shall be furnished with continuous piano hinges, unless otherwise specified, and a special flush type spring-loaded latch requiring an Allen wrench to operate. Access devices shall be installed after plastering in plaster ground openings.

F. Access panels or doors penetrating one-hour fire resistive ceilings shall meet code requirements for such openings.

G. Access panels shall be fire-rated Milcor manufactured by Inland Steel Products Co., or equal. Access doors shall be as required for installation in openings penetrating one-hour fire resistive ceilings. Access doors shall be furnished with a flush, key-operated cylinder lock, furnished with 2 keys each, instead of Allen headlock for non-rated ceilings.

H. Access panels that are part of an integrated ceiling are specified in Section 09510: Acoustical Ceilings. Identification markers shall be affixed to adjacent supports, under this portion of Work, to indicate location and type of mechanical device to be serviced.

I. Access panels installed in ducts or plenums located in heater or equipment rooms containing gas-fired equipment shall be furnished with heavy-duty spring closing hinges and refrigeration door type catches unless otherwise required. When these panels are intended for maintenance personnel access, catches shall be operable from both interior and exterior.

J. Other access panels, except those specified above, shall be furnished with suitable hinges and one or more sash fasteners.

K. Panels located in ducts and plenums shall be installed with gaskets made of synthetic rubber, felt, or similar material to provide an airtight installation. Panels shall be constructed and reinforced to prevent vibration.

L. Letter words "FIRE DAMPERS" on panels over fire dampers and words "DO NOT OPEN - HEATER IS OPERATING" on panels located in heater or equipment rooms. Letters shall be approximately 3 inches high, if space is available.

M. Furnish a key to operate latch access plates, one for each access plate, but not to exceed 5 keys for any one Project.

N. Access plates and panels shall be furnished with manufacturer's name or trade mark and model number cast or stamped thereon, or upon a label permanently affixed thereon.

O. Provide duct through roof flashing as detailed in the SMACNA standards or as indicated on Drawings.

P. Refer to SMACNA Figures 2-12 and 2-13 for access plate and door construction.

3.20 PRESSURE TESTING

A. Test and provide substantially airtight supply, return and exhaust ducts, plenums and casings at static pressure indicated for system before covering with insulation or concealing in masonry. Substantially airtight shall be construed to mean that no air leakage is noticeable through senses of feeling or hearing at duct joints. Test ductwork for leaks at 1-1/2 times operating pressure but at a minimum of 2 inches of water.

3.21 CLEANUP
A. Remove rubbish, debris and waste materials and legally dispose off the Project site.

3.22 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION
SECTION 15900

HVAC INSTRUMENTATION AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section includes: Provide temperature controls for air conditioning, heating, and ventilating systems as indicated. Work includes, but is not be limited to, the following:

1. Furnish a totally native BACnet-based system, based on a distributed control system in accordance with this specification. All building controllers, application controllers, and all input/output devices shall communicate using the protocols and network standards as defined by ANSI/ASHRAE Standard 135–2001, BACnet. In other words, all controllers, including unitary controllers, shall be native BACnet devices.

2. Provide all necessary BACnet-compliant hardware and software to meet the system's functional specifications. Provide Protocol Implementation Conformance Statement (PICS) for Windows-based control software and every controller in system, including unitary controllers.

3. Prepare individual hardware layouts, interconnection drawings, and software configuration from project design data.

4. Prepare individual hardware layouts, interconnection drawings, and software configuration from project design data.

5. Design, provide, and install all equipment cabinets, panels, data communication network cables needed, and all associated hardware.

6. Provide and install all interconnecting cables between supplied cabinets, application controllers, and input/output devices.

7. Provide and install all interconnecting cables between all operator's terminals and peripheral devices (such as printers, etc.) supplied under this section.

8. Provide complete manufacturer's specifications for all items that are supplied. Include vendor name of every item supplied.

9. Provide supervisory specialists and technicians at the job site to assist in all phases of system installation, startup, and commissioning.

10. Provide a comprehensive operator and technician training program as described herein.

11. Provide as-built documentation, software, diagrams, and all other associated project operational documentation (such as technical manuals) on approved media, the sum total of which accurately represents the final system.

12. Provide new sensors, valves, and install only new electronic actuators. No used
components shall be used as any part or piece of the installed system.

13. Furnishing and installing electric relays (magnetic starters excepted), electric or mechanical linkages, duct sensors, thermostats, dampers and motorized valves, and appurtenances and accessories required to make a complete and operable electric, electronic control installation.

14. Wiring outlet boxes and conduits, unless otherwise noted, for control systems, including wiring required to connect magnetic starters, (specified in other sections) to control systems.

15. Testing and adjusting temperature control system.

16. Furnishing record drawings and operational data of systems as installed and finally adjusted.

C. Following items are specified in other sections:

1. Magnetic starters, contacts, power relays and variable resistors or controllers for motors, and other electrical devices.

2. Load carrying wiring for above listed devices and wiring for starting switches not interconnected with temperature control system. (Division16: Electrical).

3. Electrical power to control panels and other equipment. (Division16: Electrical).

4. Installing automatic valves in pipelines.

5. Installing automatic dampers.

6. Automatic controls and valves not connected with comfort heating, ventilating and air conditioning systems.

7. Packaged self contained equipment specified complete with temperature controls.

D. Related Sections:

1. Section 15010: Basic Mechanical Requirements.

2. Section 15050: Basic Mechanical Materials and Methods.


5. Section 15600: Refrigeration Equipment.


7. Section 15800: Air Distribution.

8. Division 16: Electrical.

E. System Description:

1. A distributed logic control system complete with all software and hardware
functions shall be provided and installed. System shall be completely based on ANSI/ASHRAE Standard 135-2001, BACnet. This system is to control all mechanical equipment, including all unitary equipment (VAV boxes, heat pumps, fan-coils, AC units, etc.), lighting control, air handlers, boilers, and any other listed equipment using BACnet-compliant components. Non-BACnet-compliant or proprietary equipment or systems (including gateways) shall not be acceptable and are specifically prohibited.

2. Building controllers shall include complete energy management software, including scheduling building control strategies with optimum start and logging routines. All energy management software and firmware shall be resident in field hardware and shall not be dependent on the Master Network. Provide zone-by-zone direct digital logic control of space temperature, scheduling, runtime accumulation, equipment alarm reporting, and override timers for after-hours usage. All application controllers for every terminal unit (VAV, HP, UH, etc.) air handler, boiler, and any other piece of controlled equipment shall be fully programmable and communicate on a peer-to-peer basis. Application controllers shall be mounted next to controlled equipment and communicate with building controller via a BACnet LAN.

3. Room sensors shall be provided with digital readout that allow the user to view room temperature, view outside air temperature, adjust the room setpoint within preset limits and set desired override time. User shall also be able to start and stop unit from the digital sensor. Include all necessary wiring and firmware such that room sensor includes field service mode. Field service mode shall allow technician to balance VAV zones and access any parameter in zone controller.

F. Quality Assurance:

1. The BAS system shall be designed and installed, commissioned and serviced by EMCS supplier employed, factory trained personnel. EMCS supplier shall have an in-place support facility within 2 hours response time of the site with technical staff, spare parts inventory and necessary test and diagnostic equipment.

2. The EMCS supplier shall provide full time, on site, experienced project manager for this work, responsible for direct supervision of the design, installation, start up and commissioning of the BAS system.

3. The BAS system manufacturer must have a Dealer or Customer Support call-in Center located at the corporate headquarters or corporate manufacturing facilities. The Customer Support call-in Center will be staffed by fully trained and certified technicians.

4. Materials and equipment shall be the catalogued products of manufacturers regularly engaged in production and installation of automatic temperature control systems and shall be manufacturer's latest standard design that complies with the specification requirements.

5. All BAS peer-to-peer network controllers, central system controllers and local user displays shall be UL Listed under Standard UL 916, category PAZX.

6. All electronic equipment shall conform to the requirements of FCC Regulation, Part 15, Governing Radio Frequency Electromagnetic Interference and be so labeled.

7. Control system shall be engineered, programmed and supported completely by the EMCS manufacture's supplier local office that must be within 50 miles of...
project site.

G. Reference Standards:

1. The latest edition of the following standards and codes in effect and amended as of supplier's proposal date, and any applicable subsections thereof, shall govern design and selection of equipment and material supplied:
   a. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).
   c. Uniform Building Code (UBC), including local amendments.
   d. UL 916 Underwriters Laboratories Standard for Energy Management Equipment. Canada and the US.
   e. National Electrical Code (NEC).
   f. FCC Part 15, Subpart J, Class A.
   g. EMC Directive 89/336/EEC (European CE Mark)
   h. City, county, state, and federal regulations and codes in effect as of contract date.

2. Except as otherwise indicated the system supplier shall secure and pay for all permits, inspections, and certifications required for his work and arrange for necessary approvals by the governing authorities.

1.2 SUBMITTALS

A. Provide in accordance with Division 01 and Section 15010: Basic Mechanical Requirements.

1. Complete list of items proposed to be furnished and installed under this section.

2. Manufacturer's specifications and other data required to demonstrate compliance with specified requirements.

3. Manufacturer's printed installation procedures.

B. Shop Drawings: Provide Shop Drawings, in the same size as the Drawings, prepared, signed and sealed by a mechanical engineer licensed in the State of California. Shop Drawings shall indicate temperature control diagrams, complete with equipment appurtenances required for system. Include sequence of operation description for each system. Submit in accordance with of Division 01.

C. System Documentation: Include the following in submittal package:

1. System configuration diagrams in simplified block format
2. All input/output object listings and an alarm point summary listing.
3. Electrical drawings that show all system internal and external connection points, terminal block layouts, and terminal identification.
5. Manufacturer's instructions and drawings for installation, maintenance, and operation of all purchased items.
6. Provide complete, detailed, step-by-step sequence of operation for each item of equipment and maintenance instructions—including preventive maintenance and troubleshooting instructions.
7. For all system elements—building controller(s), application controllers, routers, and repeaters—provide BACnet Protocol Implementation Conformance
8. A list of all functions available and a sample of function block programming that shall be part of delivered system.

D. Project Management: The system supplier shall provide a detailed project design and installation schedule with time markings and details for hardware items and software development phases. Schedule shall show all the target dates for transmission of project information and documents and shall indicate timing and dates for system installation, debugging, and commissioning.

E. Operating Instructions: Comply with provisions of Section 15010: Basic Mechanical Requirements. Explain and demonstrate operation of system to Owner representatives as required.

F. Warranty: Warranty shall cover all costs for parts, labor, associated travel, and expenses for a period of one year from completion of system acceptance.

   1. Hardware and software personnel supporting this warranty agreement shall provide on-site or off-site service in a timely manner after failure notification to the vendor. The maximum acceptable response time to provide this service at the site shall be 12 hours Monday through Friday, 24 hours on Saturday and Sunday.

   2. The warranty shall apply equally to both hardware and software.

1.3 QUALITY ASSURANCE

A. Manufacturer and Installer Qualifications: Comply with provisions stated under Section 15010: Basic Mechanical Requirements.

1.4 PRODUCT HANDLING

A. Production, Replacement, Delivery and Storage: Refer to Section 15010: Basic Mechanical Requirements and Section 15050: Basic Mechanical Materials and Methods.

PART 2 - PRODUCTS

2.1 TEMPERATURE CONTROLS

A. Provide temperature controls of electric, electronic microprocessor - DDC type, or a combination thereof, as indicated on Drawings, to provide required sequences or operational control.

2.2 OPERATOR’S WORKSTATION (Existing)

A. General structure of workstation interaction shall be a standard client/server relationship. Server shall be used to archive data and store system database. Clients shall access server for all archived data. Each client shall include flexibility to access graphics from server or local drive. Server shall support a minimum of 50 clients simultaneously.

2.3 TERMINAL UNIT APPLICATION CONTROLLERS (Heat Pumps, AC Units, Fan Coils, Unit Heaters, Exhaust Fans, and Boiler)

A. Provide one native BACnet application controller for each piece of unitary mechanical equipment that adequately covers all objects listed in object list for unit. All controllers shall interface to building controller via MS/TP LAN using BACnet protocol. No gateways
shall be used. Controllers shall include input, output and self-contained logic program as needed for complete control of unit.

B. BACnet Conformance:
   1. Application controllers shall as a minimum support MS/TP BACnet LAN types. They shall communicate directly via this BACnet LAN at 9.6, 19.2, 38.4 and 76.8 Kbps, as a native BACnet device. Application controllers shall be of BACnet conformance class 3 and support all BACnet services necessary to provide the following BACnet functional groups:
      a. Files Functional Group
      b. Reinitialize Functional Group
      c. Device Communications Functional Group
   2. Please refer to Section 22.2, BACnet Functional Groups in the BACnet standard for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
   3. Standard BACnet object types supported shall include as a minimum—Analog Input, Analog Output, Analog Value, Binary Input, Binary Output, Binary Value, Device, File and Program Object Types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

C. Application controllers shall include universal inputs with 10-bit resolution that can accept 3K and 10K thermistors, 0–5 VDC, 4–20 mA, dry contact signals and a minimum of 3 pulse inputs. Any input on controller may be either analog or digital. Controller shall also include support and modifiable programming for interface to intelligent room sensor. Controller shall include binary outputs on board with analog outputs as needed.

D. All program sequences shall be stored on board controller in EEPROM. No batteries shall be needed to retain logic program. All program sequences shall be executed by controller 10 times per second and shall be capable of multiple PID loops for control of multiple devices. Programming of application controller shall be completely modifiable in the field over installed BACnet LANs or remotely via modem interface. Operator shall program logic sequences by graphically moving function blocks on screen and tying blocks together on screen. Application controller shall be programmed using same programming tools as building controller and as described in operator workstation section. All programming tools shall be provided and installed as part of system.

E. Application controller shall include support for intelligent room sensor (see Section 2.9.B.) Display on room sensor shall be programmable at controller and include an operating mode and a field service mode. All button functions and display data shall be programmable to show specific controller data in each mode based on which button is pressed on the sensor. See sequence of operation for specific display requirements at intelligent room sensor.

2.4 TERMINAL BOX CONTROLLERS—SINGLE DUCT

A. Provide one native BACnet application controller for each terminal box that adequately covers all objects listed in object list for unit. All controllers shall interface to building controller via MS/TP LAN using BACnet protocol. No gateways shall be used. Controllers shall include on board CFM flow sensor, inputs, outputs and programmable, self-contained logic program as needed for control of units.
B. BACnet Conformance

1. Application controllers shall as a minimum support MS/TP BACnet LAN types. They shall communicate directly via this BACnet LAN at 9.6, 19.2, 38.4 and 76.8 Kbps, as a native BACnet device. Application controllers shall be of BACnet conformance class 3 and support all BACnet services necessary to provide the following BACnet functional groups:
   a. Files Functional Group
   b. Reinitialize Functional Group
   c. Device Communications Functional Group

2. Please refer to Section 22.2, BACnet Functional Groups, in the BACnet standard, for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

3. Standard BACnet object types supported shall include as a minimum—Analog Input, Analog Output, Analog Value, Binary Input, Binary Output, Binary Value, Device, File and Program Object Types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

C. Application controllers shall include universal inputs with 10-bit resolution that can accept 3K and 10K thermistors, 0–5 VDC, and dry contact signals. Inputs on controller may be either analog or digital. Controller shall also include support and modifiable programming for interface to intelligent room sensor with digital display. Controller shall also include binary outputs on board. For applications using variable speed parallel fans, provide a single analog output selectable for 0-10 V or 0-20 mA control signals. Application controller shall include microprocessor driven flow sensor for use in pressure independent control logic. All boxes shall be controlled using pressure independent control algorithms and all flow readings shall be in CFM (LPS if metric).

D. All program sequences shall be stored on board application controller in EEPROM. No batteries shall be needed to retain logic program. All program sequences shall be executed by controller 10 times per second and shall be capable of multiple PID loops for control of multiple devices. Programming of application controller shall be completely modifiable in the field over installed BACnet LANs or remotely via modem interface. Operator shall program logic sequences by graphically moving function blocks on screen and tying blocks together on screen. Application controller shall be programmed using the same programming tool as Building Controller and as described in operator workstation section. All programming tools shall be provided as part of system.

E. Application controller shall include support for intelligent room sensor (see Section 2.9.B.) Display on room sensor shall be programmable at application controller and include an operating mode and a field service mode. All button functions and display data shall be programmable to show specific controller data in each mode based on which button is pressed on the sensor. See sequence for specific display requirements for intelligent room sensor.

F. On board flow sensor shall be microprocessor driven and pre-calibrated at the factory. Pre-calibration shall be at 16 flow points as a minimum. All factory calibration data shall be stored in EEPROM. Calibration data shall be field adjustable to compensate for variations in terminal box type and installation. All calibration parameters shall be adjustable through intelligent room sensor. Operator workstation, portable computers and special hand-held field tools shall not be needed for field calibration.
G. Provide duct temperature sensor at discharge of each terminal box that is connected to controller for reporting back to operator workstation.

2.5 SENSORS AND MISCELLANEOUS DEVICES

A. Temperature Sensors: All temperature sensors to be solid state electronic, factory-calibrated to within 0.5°F, totally interchangeable with housing appropriate for application. Wall sensors to be installed as indicated on drawings. Mount 48 inches about finished floor. Duct sensors to be installed such that the sensing element is in the main air stream. Immersion sensors to be installed in wells provided by control contractor, but installed by mechanical contractor. Immersion wells shall be filled with thermal compound before installation of immersion sensors. Outside air sensors shall be installed away from exhaust or relief vents, not in an outside air intake and in a location that is in the shade most of the day.

B. Intelligent Room Sensor with LCD Readout:
   1. Sensor shall contain a backlight LCD digital display and user function keys along with temperature sensor. Controller shall function as room control unit, and shall allow occupant to raise and lower setpoint, and activate terminal unit for override use—all within limits as programmed by building operator. Sensor shall also allow service technician access to hidden functions as described in sequence of operation.
   2. The Intelligent Room Sensor shall simultaneously display room setpoint, room temperature, outside temperature, and fan status (if applicable) at each controller. This unit shall be programmable, allowing site developers the flexibility to configure the display to match their application. The site developer should be able to program the unit to display time-of-day, room humidity and outdoor humidity. Unit must have the capability to show temperatures in Fahrenheit or Centigrade.
   3. Override time may be set and viewed in half-hour increments. Override time count down shall be automatic, but may be reset to zero by occupant from the sensor. Time remaining shall be displayed. Display shall show the word “OFF” in unoccupied mode unless a function button is pressed.
   4. See sequence of operation for specific operation of LCD displays and function keys in field service mode and in normal occupant mode. Provide intelligent room sensors as specified in point list.
   5. Field service mode shall be customizable to fit different applications. If intelligent room sensor is connected to terminal controller, terminal box shall be balanced and all air flow parameters shall be viewed and set from the intelligent room sensor with no computer or other field service tool needed.

C. Wall Sensor: Standard wall sensor shall use solid-state sensor identical to intelligent room sensor and shall be packaged in aesthetically pleasing enclosure. Sensor shall provide override function, warmer/cooler lever for set point adjustment and port for plug-in of Field Service Tool for field adjustments. Override time shall be stored in controller and be adjustable on a zone-by-zone basis. Adjustment range for warmer/cooler lever shall also be stored in EEPROM on controller. All programmable variables shall be available to Field Service Tool through wall sensor port.

D. LCD Operator Terminal:
   1. The LCD operator terminal is a small wall- or panel-mounted operator terminal that connects directly to the BACnet LAN. The communication design and messaging structure shall comply with ANSI/ASHRAE Standard 135-2001, BACnet. Each operator terminal shall be able to display any BACnet object from anywhere in the BACnet network.
2. Each of these operator’s terminals shall have a keypad and an adjustable backlit LCD, with a simple menu structure to give occupants and technicians intuitive access to system information. It shall have a minimum 4-line by 20-character display to allow an operator to query and adjust system values.

3. The system shall allow the connection of up to 16 LCD operator terminals to each Building Controller. The operator shall have the ability to connect to each of these operator terminals with a laptop computer via an RS-232 cable to gain system access, troubleshooting, and display programming.

4. Provide LCD operator terminals in the locations shown on the drawings.

E. Field Service Tool:
1. Field service tool shall allow technician to view and modify all setpoints and tuning parameters stored in application controller. In addition, technician shall be able to view status of all inputs and outputs on digital readout. Each piece of data shall have a data code associated with it that is customizable.

2. Field service tool shall plug into wall sensor and provide all the functionality specified. Operator workstation shall include the capability to disable operation of the field service tool.

3. Provide XX Field Service Tools for this project.

F. Network Connection Tool:
1. Network connection tool shall allow technician to connect a laptop to any MS/TP network or at any MS/TP device and view and modify all information throughout the entire BACnet network. Laptop connection to tool shall be via Ethernet or PTP.

2. Provide quick connect to MS/TP LAN at each controller. Tool shall be able to adjust to all MS/TP baud rates specified in the BACnet standard.

3. Proved XX Network Connection Tools for this project.

2.6 ELECTRONIC ACTUATORS AND VALVES

A. Quality Assurance for Actuators and Valves:
1. UL Listed Standard 873 and C.S.A. Class 4813 02 certified.

2. NEMA 2 rated enclosures for inside mounting, provide with weather shield for outside mounting.

3. Five-year manufacturers warranty. Two-year unconditional and three-year product defect from date of installation.

B. Execution Details for Actuators and Valves:
1. Furnish a Freeze-stat and install “Hard Wire” interlock to disconnect the mechanical spring return actuator power circuit for fail-safe operation. Use of the control signal to drive the actuators closed is not acceptable.

2. Each DDC analog output point shall have an actuator feedback signal, independent of control signal, wired and terminated in the control panel for true position information and troubleshooting. Or the actuator feedback signal may be wired to the DDC as an analog input for true actuator position status.

3. Terminal box damper actuation shall be Floating type or Analog (2-10vdc, 4-20ma).

4. Booster-heat valve actuation shall be Floating type or Analog (2-10vdc, 4-20ma).

5. Primary valve control shall be Analog (2-10vdc, 4-20ma).
C. Actuators for Damper and Control Valves ½" to 6" shall be Electric unless otherwise specified, provide actuators as follows:

1. UL Listed Standard 873 and Canadian Standards association Class 481302 shall certify Actuators.
2. NEMA 2 rated actuator enclosures are. Use additional weather shield to protect actuator when mounted outside.
3. 5 year Manufacturers Warranty. Two-year unconditional + Three year product defect from date of installation.
4. Mechanical spring shall be provided when specified. Capacitors or other non-mechanical forms of fail-safe are not acceptable.
5. Position indicator device shall be installed and made visible to the exposed side of the Actuator. For damper short shaft mounting, a separate indicator shall be provided to the exposed side of the Actuator.
6. Overload Protection: Actuators shall provide protection against actuator burnout by using an internal current limiting circuit or digital motor rotation sensing circuit. Circuit shall insure that actuators cannot burn out due to stalled damper or mechanical and electrical paralleling. End switches to deactivate the actuator at the end of rotation are acceptable only for Butterfly Valve actuators.
7. A push button gearbox release shall be provided for all non-spring actuators.
8. Modulating actuators shall be 24Vac and consume 10VA power or less.
9. Conduit connectors are required when specified and when code requires it.

D. Damper Actuators:

1. Outside Air and Exhaust Air Damper Actuators shall be Mechanical Spring Return. Capacitors or other non-mechanical forms of fail-safe are not acceptable. The actuator mounting arrangement and spring return feature shall permit normally open or normally closed positions of the damper as required.
2. Economizer Actuators shall utilize Analog control 2-10 VDC, Floating control is not acceptable.
3. Electric damper actuators (including terminal box actuators) shall be direct shaft mounted and use a V-bolt and toothed V-clamp causing a cold weld effect for positive gripping. Single bolt or setscrew type fasteners are not acceptable.
4. One electronic actuator shall be direct shaft mounted per damper section. No connecting rods or jackshafts shall be needed. Small outside air and return air economizer dampers may be mechanically linked together if one actuator has sufficient torque to drive both and damper drive shafts are both horizontal installed.
5. Multi-section dampers with electric actuators shall be arranged so that each damper section operates individually. One electronic actuator shall be direct shaft mounted per damper section. (See below execution section for more installation details.)

E. Valve Actuators ½" to 6":

1. Mechanical spring shall be provided on all actuators for pre-heat coil and actuators for AHU heating or cooling coil when units are mounted outside. See plans for fail save flow function; Normal Open or Normal Closed. Capacitors or other non-mechanical forms of fail-safe are not acceptable.
2. All zone service actuators shall be non-spring return unless otherwise specified.
3. The valve actuator shall be capable of providing the minimum torque required for proper valve close off for the required application.
4. All control valves actuators shall have an attached 3-foot cable for easy installation to a junction box.
5. Override handle and gearbox release shall be provided for all non-spring return valve actuators.
F. Control Valves ½" to 6": The BAS contractor shall furnish all specified motorized control valves and actuators. BAS contractor shall furnish all control wiring to actuators. The Plumbing contractor shall install all valves. Equal Percentage control characteristic shall be provided for all water coil control valves. Linear valve characteristic is acceptable for 3-way valves 2½ inch and above.

1. Characterized Control Valves shall be used for hydronic heating or cooling applications and small to medium AHU water coil applications to 100GPM. Actuators are non-spring return for terminal unit coil control unless otherwise noted. If the coil is exposed to the Outside Air stream then see plans for Spring Return requirement.
   a. Leakage is Zero percent, Close-off is 200psi, Maximum differential is 30psi. Rangeability is 500:1.
   b. Valves 1/2 inch through 2 inches shall be nickel-plated forged brass body, NPT screw type connections.
   c. Valves 1/2 inch through 1-1/4 inches shall be rated for ANSI Class 600 working pressure. Valves 1-1/2 inch and 2 inches shall be rated for ANSI Class 400 working pressure.
   d. The operating temperature range shall be 0° to 250° F.
   e. Stainless steel ball & stem shall be furnished on all modulating valves.
   f. Seats shall be fiberglass reinforced Teflon.
   g. Two-way and three-way valves shall have an equal percentage control port. Full stem rotation is required for maximum flow to insure stable BTU control of the coil.
   h. Three-way valve shall be applicable for both mixing and diverting.
   i. The characterizing disc is made of TEFZEL and shall be keyed and held secure by a retaining ring.
   j. The valves shall have a blow out proof stem design.
   k. The stem packing shall consist of 2 lubricated O-rings designed for on-off or modulating service and require no maintenance.
   l. The valves shall have an ISO type, 4-bolt flange, for mounting actuator in any orientation parallel or perpendicular to the pipe.
   m. A non-metallic thermal isolation adapter shall separate valve flange from actuator.
   n. One fastening screw shall secure the direct coupling of the thermal isolation adapter between the actuator and the valve. This will prevent all lateral or rotational forces from affecting the stem and its packing O-rings.

2. Globe valves ½" to 2" shall be used for steam control or waterflow applications.
   a. Valves shall be bronze body, NPT screw type, and shall be rated for ANSI Class 250 working pressure.
   b. Valves 1/2 inch (DN15) through 2 inches (DN50) with spring return actuators shall close off against 50 psi pressure differential with Class III leakage (.1%).
   c. The operating temperature range shall be 20° to 280° F.
   d. Spring loaded TFE packing shall protect against leakage at the stem.
   e. Two-way valves shall have an equal percentage control port.
   f. Three-way valves shall a linear control and bypass port.
   g. Mixing and diverting valves must be installed specific to the valve design.

3. Globe Valve 2 ½ to 6":
   a. Valves 2-1/2 inch (DN65) through 6 inches (DN50) shall be iron body, 125 lb. flanged with Class III (.1%) close-off leakage at 50 psi differential.
   b. Valves with spring return actuators shall close off against 50 psi pressure differential with Class III leakage (.1%).
c. Flow type for two-way valves shall be equal percentage. Flow type for three-way valves shall be linear.

d. Mixing and diverting valves must be installed specific to the valve design.

G. Butterfly Valves:
1. Butterfly Valves shall be sized for modulating service at 60-70 degree stem rotation. Isolation valves shall be line-size. Design velocity shall be less than 12 feet per second when used with standard EPDM seats
   a. Body is Cast Iron.
   b. Disc is Aluminum Bronze standard.
   c. Seat is EPDM Standard.
   d. Body Pressure is 200 psi, -30°F to 275°F.
   e. Flange is ANSI 125/250.
   f. Media Temperature Range is -22°F to 240°F
   g. Maximum Differential Pressure is 200 psi for 2" to 6" size.

H. Butterfly Valve Industrial Actuators:
1. Actuators shall be approved under Canadian Standards Association or other Nationally Recognized Testing Laboratory to UL standards. CSA Class 4813 02 or equal. Enclosure shall be NEMA 4 (weatherproof) enclosure and will have an industrial quality coating.
   a. Actuator shall have a motor rated for continuous duty. The motor shall be fractional horsepower; permanent split capacitor type designed to operate on a 120 VAC, 1 pH, 60 Hz supply. Two adjustable cam actuated end travel limit switches shall be provided to control direction of travel. A self-resetting thermal switch shall be imbedded in the motor for overload protection.
   b. Reduction gearing shall be designed to withstand the actual motor stall torque. Gears shall be hardened alloy steel, permanently lubricated. A self-locking gear assembly or a brake shall be supplied.
   c. Actuator shall have a 6 ft wiring harness provided for ease in field wiring (above 1500 in-lbs). Two adjustable SPDT cam-actuated auxiliary switches, rated at 250 VAC shall be provided for indication of open and closed position. Actuator shall have heater and thermostat to minimize condensation within the actuator housing.
   d. Actuator shall be equipped with a hand wheel for manual override to permit operation of the valve in the event of electrical power failure or system malfunction. Hand wheel must be permanently attached to the actuator and when in manual operation electrical power to the actuator will be permanently interrupted. The hand wheel will not rotate while the actuator is electrically driven.
   e. The actuator shall be Analog, floating, or two position as called out in the control sequence of operation. All Analog valves shall be positive positioning, and respond to a 2-10 VDC, 4-20 mA, or adjustable signal as required. Analog actuators shall have a digital control card allowing any voltage input for control and any DC voltage feedback signal for position indication.

2. Performance Verification Test:
   a. Control loops shall cause productive actuation with each movement of the actuator and actuators shall modulate at a rate which is stable and responsive. Actuator movement shall not occur before the effects of previous movement have affected the sensor.
   b. Actuator shall have capability of signaling a trouble alarm when the actuator Stop-Go Ratio exceeds 30%.
3. Actuator Mounting for Damper and Valve arrangements shall comply to the following:
   a. Damper Actuators: Shall not be installed in the air stream.
   b. A weather shield shall be used if actuators are located outside. For Damper Actuators use clear plastic enclosure.
   c. Damper or valve actuator ambient temperature shall not exceed 122 degrees F through any combination of medium temperature or surrounding air. Appropriate air gaps, thermal isolation washers or spacers, standoff legs, or insulation shall be provided as necessary.
   d. Actuator cords or conduit shall incorporate a drip leg if condensation is possible. Water shall not be allowed to contact actuator or internal parts. Location of conduits in temperatures dropping below dew point shall be avoided to prevent water from condensing in conduit and running into actuator.
   e. Damper mounting arrangements shall comply to the following:
      1) The ventilation subcontractor shall furnish and install damper channel supports and sheet metal collars.
      2) No jack shafting of damper sections shall be allowed.
      3) Multi-section dampers shall be arranged so that each damper section operates individually. One electronic actuator shall be direct shaft mounted per section.
   f. Size damper sections based on actuator manufacturers specific recommendations for face velocity, differential pressure and damper type. In general:
      1) Damper section shall not exceed 24 ft-sq. with face velocity \( \leq 1500 \) FPM.
      2) Damper section shall not exceed 18 ft-sq. with face velocity \( \leq 2500 \) FPM.
      3) Damper section shall not exceed 13 ft-sq. with face velocity \( \leq 3000 \) FPM.
   g. Multiple section dampers of two or more shall be arranged to allow actuators to be direct shaft mounted on the outside of the duct.
   h. Multiple section dampers of three or more sections wide shall be arranged with a 3-sided vertical channel (8" wide by 6" deep) within the duct or fan housing and between adjacent damper sections. Vertical channel shall be anchored at the top and bottom to the fan housing or building structure for support. The sides of each damper frame shall be connected to the channels. Holes in the channel shall allow damper drive blade shafts to pass through channel for direct shaft mounting of actuators. Open side of channel shall be faced down stream of the airflow, except for exhaust air dampers.
   i. Multiple section dampers to be mounted flush within a wall or housing opening shall receive either vertical channel supports as described above or sheet metal standout collars. Sheet metal collars (12" minimum) shall bring each damper section out of the wall to allow direct shaft mounting of the actuator on the side of the collar.

4. Valve Sizing for Water Coil
   a. On/Off Control Valves shall be line size.
   b. Modulating Control Valve Body Size may be reduced at most two pipe sizes from the line size or not less than \( \frac{1}{2} \) the pipe size. The BAS contractor shall size all water coil control valves for the application as follows:
      1) Booster-heat valves shall be sized not to exceed 4-9psi differential pressure. Size valve for 50% Valve Authority. Valve
design pressure drop is equal to the sum of coil drop plus the balance valve drop.

2) Primary valves shall be sized not to exceed 5-15psi differential pressure. Size valve for 50% Valve Authority. Valve design pressure drop is equal to the sum of coil drop plus the balance valve drop.

3) Butterfly valves shall be sized for modulating service at 60-70 degree rotation. Design velocity shall be 12 feet per second or less when used with standard EPDM seats.

c. Valve Mounting arrangements shall comply to the following:
   1) Unions shall be provided on all ports of two-way and three-way valves.
   2) Install three-way equal percentage Characterized Control valves in a mixing configuration with the “A” port piped to the coil.
   3) Install 2½ inch and above, Three-Way globe valves, as manufactured for mixing or diverting service to the coil.

2.7 ENCLOSURES

A. All controllers, power supplies and relays shall be mounted in enclosures.

B. Enclosures may be NEMA 1 when located in a clean, dry, and indoor environments. Indoor enclosures shall be NEMA 4 when installed in other than a clean environment. Enclosures shall be NEMA 3R when exposed to outside weather conditions.

C. Enclosures shall have hinged and locking doors.

D. Provide laminated plastic nameplates for all enclosures in any mechanical room or electrical room. Include location and unit served on nameplate. Laminated plastic shall be 1/8" thick sized appropriately to make label easy to read.

2.8 ELECTRIC EQUIPMENT AND ACCESSORIES

A. Electric control equipment and accessories include, but are not limited to, the following:

1. Electric control devices as indicated on Drawings and described herein, including thermostats, temperature controllers, valve and damper operators, switches, relays and control panels for instruments as required to provide a complete and operable system.

2. Wiring and conduit, unless otherwise noted, or control systems including wiring required, to connect magnetic starters specified in other sections, to control systems.

B. Room Thermostats:

1. Thermostats for unitary air conditioning units shall be as specified in Section 15700 – Heating, Ventilating and Air Conditioning Equipment. Thermostats located on outside walls shall be installed on insulated backplates or as specified by unit manufacturer.

C. Duct-Mounted Thermostats: Duct-mounted thermostats shall be modulating or 2-position as required to accomplish sequence of operation.

D. Valve and Damper Motors: Damper motors shall be furnished with oil-immersed gear trains and ample capacity to handle required loads under normal operating conditions. Where
indicated, spring return type motors are to be provided. Valve motors to be 2-position or proportional, spring return or now spring return.

E. Time Clocks:

1. TC-1: Time clock shall be solid-state digital electronic type capable of 28 on/off set points to be distributed through the week, complete with a day repeat feature, time and set points to be adjustable to nearest minute with a minimum on duration of one minute and a maximum of 7 days, LED readout to show day of week and time of day using 12 hour AM/PM indicator, wired to be powered by 120 volt 60 cycle source and switch configuration to be SPDT with a rating of 5 amps. UL listed, enclosed in standard case NEMA Type 1, with battery operated carry-over.

2. TC-2: Interval timer (bypass), except for window units, shall be manually set and spring operated type, 0 to 6 hours, without hold feature.

F. Wiring: Wiring in connection with control systems regardless of voltage, power supply circuits excepted, is part of the Work of this section. Wiring shall comply with Division 16: Electrical.

2.9 ELECTRONIC EQUIPMENT AND ACCESSORIES

A. Electronic equipment and accessories includes, but is not limited to, the following:

1. Electronic controls and devices as indicated on Drawings and described herein including thermostats, temperature controllers, valve and damper operators, switches, relays and control panels for instruments as required to provide a complete and operable system.

2. Wiring and conduit, unless otherwise noted, for control systems including wiring required to connect magnetic starters specified in other sections to control systems.

B. Controllers:

1. Electronic controllers will be solid-state type utilizing electronic bridge control circuitry and having capability of providing a separate, direct acting and reverse-acting signal across null with band width adjustments and settings for both direct-acting and reverse-acting signals.

2. Output signals shall be 0-16 volt DC and shall be capable of operating one or 2 electronic operators.

3. Controllers shall be capable of being furnished with main and auxiliary sensing circuits for master and submaster type applications. These circuits shall be available for local or remote set point ranges. Sensing elements utilized with these controllers shall be nickelwire resistance element type.

4. Electronic controllers shall be capable of being installed with more than one actuator for sequencing. Controllers shall be panel-mounted.

C. Auxiliary Devices:

1. Furnish and install necessary auxiliary electronic devices as required to accomplish sequence as specified. These totally electronic devices shall include, but not be limited to, such items as load limiting controllers, low signal selectors, high signal selectors, remote reset control devices, remote set point control devices, floating
alarm units, staging networks, damper position indicators, unison amplifiers, reversing networks, sequencing networks and electronic power supplier.

2. Indication meters shall be furnished on panels to indicate output signals from controllers and auxiliary devices.

2.10 MANUFACTURERS

A. Equipment in system shall be of same manufacturer or their standard furnished items. Testing, initial start-up and adjusting of control system shall be under continuous observation of the mechanical engineer responsible for Shop Drawing preparation.

B. Electric, electronic or direct digital microprocessor based control equipment shall be one of following manufacturers, unless otherwise noted:

1. Alerton, Inc. by Climatec Building Technologies Group.

2. Honeywell, Inc.

3. Johnson Controls, Inc.

PART 3 - EXECUTION

3.1 TEMPERATURE CONTROL SYSTEM INSTALLATION

A. Control system shall be installed in accordance with control manufacturer's instructions and reviewed Shop Drawings.

3.2 EXAMINATION

A. Prior to starting work, carefully inspect installed work of other trades and verify that such work is complete to the point where work of this Section may properly commence.

B. Notify the owners' representative in writing of conditions detrimental to the proper and timely completion of the work.

C. Do not begin work until all unsatisfactory conditions are resolved.

3.3 INSTALLATION (GENERAL)

A. Install in accordance with manufacturer's instructions.

B. Provide all miscellaneous devices, hardware, software, interconnections installation and programming required to ensure a complete operating system in accordance with the sequences of operation and point schedules.

3.4 LOCATION AND INSTALLATION OF COMPONENTS

A. Locate and install components for easy accessibility; in general, mount 48 inches above floor with minimum 3'-0" clear access space in front of units. Obtain approval on locations from owner's representative prior to installation.

B. All instruments, switches, transmitters, etc., shall be suitably wired and mounted to protect them from vibration, moisture and high or low temperatures.

C. Identify all equipment and panels. Provide permanently mounted tags for all panels.
D. Provide stainless steel or brass thermowells suitable for respective application and for installation under other sections—sized to suit pipe diameter without restricting flow.

3.5 INTERLOCKING AND CONTROL WIRING

A. Provide all interlock and control wiring. All wiring shall be installed neatly and professionally, in accordance with Specification Division 16 and all national, state and local electrical codes.

B. Provide wiring as required by functions as specified and as recommended by equipment manufacturers, to serve specified control functions. Provide shielded low capacitance wire for all communications trunks.

C. Control wiring shall not be installed in power circuit raceways. Magnetic starters and disconnect switches shall not be used as junction boxes. Provide auxiliary junction boxes as required. Coordinate location and arrangement of all control equipment with the owner’s representative prior to rough-in.

D. Provide auxiliary pilot duty relays on motor starters as required for control function.

E. Provide power for all control components from nearest electrical control panel or as indicated on the electrical drawings—coordinate with electrical contractor.

F. All control wiring in the mechanical, electrical, telephone and boiler rooms to be installed in raceways. All other wiring to be installed neatly and inconspicuously per local code requirements. If local code allows, control wiring above accessible ceiling spaces may be run with plenum rated cable (without conduit).

3.6 CONTROL PANELS OR CABINETS

A. Switches, clocks, temperature control instruments, and remote bulb thermometers, whose capillary tubes are under 25 feet in length, shall be mounted in control panels with required wiring, piping, and tubing behind panel. Control panels shall be galvanized steel sheet metal, with light gray hammertone enamel finish, not lighter than 14 gage. Control panels shall comply with the Los Angeles City Electrical Work Specifications. Panels shall be attached to wall at locations indicated, or as required. Adjustable apparatus shall be provided with screwed or riveted green Micarta plate engraved in white to indicate function. A clear space of 30 inches in front shall be maintained.

B. At locations indicated on Drawings, control cabinets shall be provided with door locks. Door locks shall be the flush type, latched, Corbin No. 15751, 5/8 inch for metal door, keyed to a Corbin Cat. No. 60 key. Cabinet shall be prime coated and finish painted as specified in Section 09900: Paints and Coatings. Cabinet shall be flush mounted.

3.7 ROOM THERMOSTAT

A. Room thermostats shall be wall mounted at a height of approximately 4 feet. Room thermostats are not permitted on outside walls, at chalkboards, between shelving, in recesses or above heat producing equipment. When installation is necessary in tuckboards, review by the Architect is required. Units shall be installed as close to edge of the tack board as possible. Room thermostats shall be furnished with approved tamperproof cover. Thermostats shall be furnished with set point windows and integral thermometers. Office thermostats shall be furnished with extended adjustment knobs; all others shall have key adjustments. Unless indicated otherwise, room thermostats shall be furnished with non-switching sub-bases.
3.8 COORDINATION

A. Coordinate this Work with other aspects of system balancing to obtain a complete operating mechanical system in accordance with design intent, including coordinating with balancing of the system.

B. Coordinate this Work with all aspects of alarm, fire alarm, and smoke detector, specified in Division 16: Electrical.

3.9 CONTROL SYSTEM ADJUSTMENTS

A. Perform adjustments under operating conditions to provide sequence of operation for controls indicated. If required operating conditions cannot be obtained before Substantial Completion, due to outdoor seasonal temperatures, return to the Project site when requested by the Owner and readjust control system when outdoor temperatures will permit proper operating conditions. Start readjustment within 7 calendar days after notification. Final settings of controls and pressure ranges indicated by gauges shall be indicated on project record documents.

3.10 AS BUILT DOCUMENTATION

A. After completion of the project, provide final approved documentation:
   1. An operator’s manual including detailed man-machine interface.
   2. An operator’s reference table listing the addresses of all connected input points and output points. Show settings where applicable.
   3. A programmer’s manual including all information necessary to perform the programming function.
   4. A language manual including a detailed description of the language used and all routines, modules, etc., used by the system.
   5. Flow charts of the software programs utilized in the system.
   6. Complete program listing file, and parameter listing file for all programs.
   7. As-built drawings.

B. Provide two (2) AutoCad (latest version) CD and one (1) full size reproducible of each control diagram and equipment schedule reflecting the "as-built" condition. Size shall be the same as the construction document drawings.

3.11 TRAINING

A. Provide application engineer to instruct owner in operation of systems and equipment.

B. Provide system operator’s training to include (but not limited to) such items as the following: modification of data displays, alarm and status descriptors, requesting data, execution of commands and request of logs. Provide this training to a minimum of 3 persons.

C. Provide on-site training above as required, up to 16 hours as part of this contract.

D. Provide tuition for at least two individuals for a one-week factory training class. If applicable, costs for travel, lodging and meals will be the responsibility of the Owner.

3.12 DEMONSTRATION

A. Provide systems demonstration under provisions of Section 15010.
B. Upon completion of the installation, start up the system and perform all necessary testing, debugging and calibration of each component in the entire system. Perform an acceptance test in the presence of the Owner's Representative. When the system performance is deemed satisfactory in whole or in part of the by the Owner's Representative, the part(s) of the system will be accepted.

C. Provide certificate stating that control system has been tested and adjusted for proper operation.

D. Final system acceptance shall be contingent upon completion of final review and correction of all deficiencies. Satisfactory completion of the operational tests shall demonstrate compliance with all performance and requirements of the Contract Documents.

3.13 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.14 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

PART 4 - SEQUENCE OF OPERATIONS

4.1 GENERAL

A. Provide a complete and operational temperature control and building automation system based on the following points and sequence of operation. The system shall be complete as to sequences and standard control practices. The determined point list is the minimum amount of points that are to be provided. If additional points are required to meet the sequence of operation, they will be provided.

B. BACnet Object List:
   1. The following points as defined for each piece of equipment are designated as follows:
      a. Binary Out (BO) - Defined as any two-state output (start/stop) (enable/disable), etc.
      b. Binary In (BI) - Defined as any two-state input (alarm, status), etc.
      c. Analog In (AI) - Defined as any variable input (temperature) (position), etc.
      d. Analog Out (AO) - Defined as any electrical variable output. 0–20mA, 4–20mA and 0–10VDC are the only acceptable analog outputs. The driver for analog outputs must come from both hardware and software resident in the controllers. Transducers will not be acceptable under any circumstance.

END OF SECTION
SECTION 16010

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE

A. This section supplements all sections of this division and shall apply to all phases of work hereinafter specified, shown on the drawings, or required to provide a complete installation of electrical systems for the Project. The Work required under this division, is not limited to the Electrical Drawings. Refer to Site, Architectural, Structural, and Mechanical Drawings that may designate Work to be accomplished. The intent of the Specifications is to provide a complete electrical system that includes all documents that are a part of the Contract.

1. Work Included: Furnish all labor, material, services and skilled supervision necessary for the construction, erection, installation, connections, testing, and adjustment of all circuits and electrical equipment specified herein, or shown or noted on the Drawings, and its delivery to the Owner complete in all respects ready for use.

B. Contract Drawings: The Contract Drawings are shown in part diagrammatic, intended to convey the Scope of Work indicating the intended general arrangement of equipment, conduit and outlets. Follow the contract drawings in laying out the work and verify spaces for the installation of the materials and equipment based on actual dimensions of equipment furnished. Where conflicts occur, the most stringent application shall apply wherever a question exists as to the exact intended location of outlets or equipment, obtain instructions from the Architect before proceeding with the Work.

C. Equipment or Fixtures: Equipment and fixtures shall be connected to provide circuit continuity in accordance with the Specifications whether or not each piece of conductor, conduit, or protective device is shown between such items of equipment or fixtures, and the point of circuit origin.

D. Work Installed but Furnished under Other Sections: The Electrical Work includes the installation or connection of certain materials and equipment furnished under other sections. Verify installation details. Foundations for apparatus and equipment will be furnished under other sections unless otherwise noted or detailed.

1.2 GENERAL REQUIREMENTS

A. Guarantee: Furnish a written guarantee for a period of one year from date of substantial completion.

B. Equipment Safety: All electrical materials and equipment shall be new and shall be listed by Underwriter's Laboratories and bear their label, or listed and certified by a nationally recognized testing authority where UL does not have an approval. Custom made equipment must have complete test data submitted by the manufacturer attesting to its safety.

C. Codes and Regulations:

1. Design, manufacture, testing and method of installation of all apparatus and materials furnished under the requirements of these specifications shall conform to the latest publications or standard rules of the following:
Institute of Electrical and Electronic Engineers - IEEE
National Electrical Manufacturers' Association - NEMA
California Fire Code - CFC
California Building Code - CBC
Underwriters' Laboratories, Inc. - UL
National Fire Protection Association - NFPA
American Society for Testing and Materials - ASTM
American National Standards Institute - ANSI
American Standard Association - ASA
California Electrical Code - CEC
National Electrical Safety Code - NESC
Insulated Power Cable Engineers Association - IPCEA
Public Utilities Commission - PUC
California Code of Regulations, Title 8, Subchapter 5
California Code of Regulations, Title 24
State & Municipal Codes in Force in the Specific Project Area
Occupational Safety and Health Administration - OSHA

The term "Code", when used within the specifications, shall refer to the Publications, Standards, ordinances and codes, listed above. In the case where the codes have different levels of requirements the most stringent rules shall apply.

D. Requirements of Regulatory Agencies:

1. Codes, Permits and Fees: Where the Contract Documents exceed minimum requirements, the Contract Documents take precedence. Where code conflicts occur, the most stringent shall apply unless variance is approved. **Where provisions in the drawings and specifications differ in regard to code application, size, quality, quantity or type of equipment, Contractor shall include in the bid, costs for the most costly provision either denoted in the specifications or on the drawings. This provision shall apply as an amendment to the California Public Contracts Code.**

   a. Comply with all requirements for permits, licenses, fees and Code. Permits, licenses, fees, inspections and arrangements required for the Work shall be obtained by the Contractor at his expense, unless otherwise specified.

   b. Comply with the requirements of the applicable utility companies serving the Project. Make all arrangements with the utility companies for proper coordination of the Work.

2. Substitutions: The materials, products, and equipment described in the Contract Documents establish a standard of required function, dimension, appearance, and quality. Architect may consider requests for substitutions of specified equipment, materials, or products and then only when request are submitted in accordance with the provisions of the Contract Documents, Division 1, and are received by the Architect a minimum of 21 days prior to the date established for the receipt of the bid. No substitutions will be considered after the date of the receipt of the bid or contract award unless there is cause for a substitution which complies in every respect to the provisions of the Contract Documents, Division 1. Substitution requests shall be made in accordance with Public Contracts Code (AB2084) revisions as follows:

   a. **No substitutions are allowed after bid opening.**

   b. **All substitutions must be requested 21 days prior to bid opening date.**

   c. Final addendum naming approved substitutions of materials/equipment must be issued 7 days prior to bid date.
F. Record Drawings: Comply with Division 1. Keep up to date, monthly payments withheld if not updated.

G. Shop Drawings and Submittals: Submittals on all material prior to installation.
   1. Drawings shall be submitted, as required under Division 1.
   2. Shop drawings shall be submitted on, but not limited to, the following:
      a. 16111 Conduit
      b. 16123 Building Wire and Cable
      c. 16130 Boxes
      d. 16140 Wiring Devices
      e. 16440 Disconnect Switches
      f. 16510 Interior Luminaries
      g. 16721 Fire Alarm and Smoke Detection Systems

H. Cutting and Patching:
   1. Obtain written permission from the Architect before core drilling or cutting any structural members. Exact method and location of conduit penetrations and/or openings in concrete walls, floors, or ceilings shall be as approved by the Architect.
   2. All core drilling, cutting and patching for this work shall be performed under this Section of the specifications. Use craftsmen skilled in their respective sections for cutting, fitting, repairing, patching of plaster and finishing of materials including carpentry work, metal work or concrete work required for this Work. Do not weaken walls, partitions or floor with cutting. Holes required to be cut in floors must be drilled without excessive breaking out around the holes. Patching and/or refinishing shall be determined by the Architect.
   3. Use care in piercing waterproofing. After the part piercing the waterproofing has been set in place, seal openings and make absolutely watertight.
   4. Seal all openings to meet the fire rating of the particular wall floor or ceiling. Conform to Division 1.
   5. Conform to Division 1.

1.3 JOB CONDITIONS

A. Existing Conditions:
   1. The contractor shall visit the site and verify existing conditions. Where existing conditions differ from the drawings, adjustment shall be made and allowances included for all necessary equipment to complete all parts of the drawings and specifications.
   2. Electrical circuits affecting work shall be de-energized while working on or near them.
3. Arrange the work so that electrical power is available to all electrical equipment within existing facility at all times. Schedule all interruptions at the convenience of the Owner, including exact time and duration. Provide temporary power during all periods of interruption, which are deemed excessive by the Owner. Costs of all premium time (overtime) resulting from the scheduled power interruptions and all costs for providing temporary power shall be included in the cost of the Work.

B. Protection:

1. Protection of apparatus, materials and equipment. Take such precautions as necessary to properly protect all apparatus, fixtures, appliances, material, equipment and installations from damage of any kind. The Engineer may reject any particular piece or pieces of material, apparatus or equipment scratched, dented or otherwise damaged.

2. Seal equipment or components exposed to the weather and make watertight and insect proof. Protect equipment outlets and conduit openings with temporary plugs or caps at all times that work is not in progress.

C. Sequencing and Scheduling:

1. Work lines and established heights shall be in strict accordance with architectural drawings and specifications insofar as these drawings and specifications extend. Verify all dimensions shown and establish all elevations and detailed dimensions not shown.

2. Lay out and coordinate all work well enough in advance to avoid conflicts or interferences with other work in progress so that in case of interference the electrical layout may be altered to suit the conditions, prior to the installation of any work and without additional cost to the Owner. Conflicts arising from lack of coordination shall be this Contractor's responsibility. Maintain all code-required clearances about electrical equipment. Unless specifically noted otherwise, establish the exact location of electrical equipment based on the actual dimensions of equipment furnished.

1.4 WORK IN COOPERATION WITH OTHER SECTIONS

A. Examine the drawings and specifications and determine the work to be performed by the electrical, mechanical and other sections. Provide the type and amount of electrical materials and equipment necessary to place this work in proper operation, completely wired, tested and ready for use. This shall include all conduit, wire, motor starters, disconnects, relays, time clocks and other devices for the required operation sequence of all electrical, mechanical and other systems or equipment. Where a conflict occurs on drawings, the most stringent shall apply.

B. Provide conduit and wire for all controls and other devices, both line and low voltage, described in this or other parts of the contract documents. Install all control housings and backboxes required for installing conduit and wire to the controls.

C. Install control wiring in separate conduit between each heating, ventilating and air conditioning sensing device and its control panel and/or control motor. Before installing any conduit for heating, ventilating and air conditioning control wiring, verify from the control manufacturer's shop drawings where these separate conduit runs are required.

D. Plan all work so that it proceeds with a minimum of interference with other sections. Inform all parties concerned of openings required for equipment or conduit required in the building construction for Electrical Work and provide all special frames, sleeves and anchor bolts as required. Coordinate the electrical work with the mechanical installation. Promptly report to the Architect any delay or difficulties encountered in the installation of this work which might prevent prompt and proper installation, or make it unsuitable to connect with or receive the work of other
sections. Failure to so report shall constitute an acceptance of the work of other sections as being fit and proper for the execution of this work.

1.5 TESTING AND ADJUSTMENT

A. Upon completion of all Electrical Work, the contractor shall provide all testing as follows:

1. Operational Test: Test all circuit breakers, receptacles, motors and all other electrical and communication equipment. Replace all faulty devices and equipment discovered during testing with new devices and equipment at no additional cost, and that part of the system (or devices or equipment) shall then be retested.

2. Secondary Grounding Resistance: Perform ground continuity test between main ground system and equipment frame, system neutral and/or derived neutral point.

3. Ground Fault System Test: Measure system neutral insulation resistances to ensure no shunt ground paths exist.

4. All test procedure shall be performed by an independent testing firm.

5. All test procedures shall conform to NETA International Electrical Testing Association standards.

1.6 MAINTENANCE, SERVICING AND INSTRUCTION MANUALS, AND WIRING DIAGRAMS

A. Prior to substantial completion, the contractor shall submit 5 copies of operating and maintenance and servicing instructions, as well as an equal number of copies of complete wiring diagrams all neatly bound in hard cover 3-ring binders with table of contents and tabs for the following items or equipment: (See Division 1 - Operation and Maintenance Data):

1. Section 16721 - Fire Alarm & Smoke Detection Systems

B. All wiring diagrams shall specifically cover the installed system indicating zones, wiring, and components added to the system. Typical drawings will not be accepted.

1.7 FINAL INSPECTION AND ACCEPTANCE

A. After all requirements of the specifications and/or the drawings have been fully completed, representatives of the Owner will inspect the Work. The Contractor shall provide competent personnel to demonstrate the operation of any item of system, to the full satisfaction of each representative. The Contractor shall provide 4 hours of minimum scheduled operation and maintenance training for school maintenance staff on each system indicated in 1.06A above. See specific sections for additional training/operation hours required for school personnel.

B. Final acceptance of the work will be made by the Owner after receipt of approval and recommendation of acceptance from each representative.

C. The Contractor shall furnish Record Drawings before final payment of retention.

END OF SECTION
SECTION 16060
MINOR ELECTRICAL DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Electrical demolition.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify field measurements and circuiting arrangements are as shown on Drawings.
B. Verify that abandoned wiring and equipment serve only abandoned facilities.
C. Demolition Drawings are based on casual field observation and existing record drawings. Report discrepancies to Architect/Engineer before disturbing existing installation.
D. Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.
B. Coordinate utility service outages with Utility Company.
C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
D. Existing Electrical Service: Maintain existing system in service until new system extension is complete and ready for service. Interrupt system only to make switchovers and connections. Obtain permission from Owner seven days before partially or completely interrupting the system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.
E. Existing Fire Alarm System: Maintain existing system in service until new system extension is accepted. Temporarily interrupt existing system only to make connections. Notify Owner and Architect/Engineer, and local fire service] at least seven days before partially or completely interrupting the system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.
F. Existing Telephone System: Maintain existing system in service until new system extension is complete and ready for service. Interrupt system only to make switchovers and connections. Notify Owner and Architect/Engineer, and Telephone Utility Company at least seven days before partially or completely interrupting the system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Demolish and extend existing electrical work under provisions of Division 1, Division 2, and this Section.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned wiring to source of supply.

D. Remove exposed abandoned conduit, including abandoned conduit. Cut conduit flush with walls and floors, and patch surfaces.

E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

F. Disconnect and remove abandoned panelboards and distribution equipment.

G. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

H. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

I. Repair adjacent construction and finishes damaged during demolition and extension work.

J. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

K. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.4 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

3.5 INSTALLATION

A. Install relocated materials and equipment under the provisions of Division 1.

END OF SECTION
SECTION 16111

CONDUIT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Metal conduit.
B. Flexible metal conduit.
C. Liquidtight flexible metal conduit.
D. Electrical metallic tubing.
E. Nonmetal conduit.
F. Electrical nonmetallic tubing.
G. Flexible nonmetallic conduit.
H. Fittings and conduit bodies.

1.2 REFERENCES

A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
B. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.
C. ANSI C80.5 - Rigid Aluminum Conduit.
D. ANSI/NEMA FB 1-88 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
E. CEC – California Electrical Code.
F. NECA "Standard of Installation."
G. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
H. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
I. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.3 DESIGN REQUIREMENTS

A. Conduit Size: CEC – California Electrical Code.

1.4 SUBMITTALS

A. Submit under provisions of Division 1.
B. Product Data: Provide for metallic conduit, flexible metal conduit, liquidtight flexible metal conduit, metallic tubing, nonmetallic conduit, flexible nonmetallic conduit, nonmetallic tubing, fittings, and conduit bodies.

1.5 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 1.

B. Accurately record actual routing of conduits larger than 2 inches.

1.6 REGULATORY REQUIREMENTS

A. Furnish products listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.7 FIELD SAMPLES

A. Provide under provisions of Division 1.

B. Provide field sample of conduit, two each at 2 feet long.

C. Provide field sample of expansion/deflection fitting, two each.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle Products to site under provisions of Division 1.

B. Accept conduit on site. Inspect for damage.

C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

D. Protect PVC conduit from sunlight.

1.9 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.

B. Verify routing and termination locations of conduit prior to rough in.

C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

PART 2 - PRODUCTS

2.1 CONDUIT REQUIREMENTS

A. Minimum Size: 3/4 inch unless otherwise specified.

B. Underground Installations:

1. More than Five Feet from Foundation Wall: Use rigid steel conduit, intermediate metal conduit, concrete encased PVC Schedule 40 or as indicated on drawings.
2. Within Five Feet from Foundation Wall: Use intermediate metal conduit, concrete encased PVC Schedule 40 or as indicated on drawings.

3. In or Under Slab on Grade: Use rigid steel conduit, intermediate metal conduit, and plastic coated conduit and thickwall nonmetallic conduit.

4. Minimum Size: 3/4 inch, unless otherwise noted.

C. Outdoor Locations, Above Grade: Use rigid steel and aluminum conduit, and intermediate metal conduit for locations from finished grade to 10 feet above finished grade or electrical metallic tubing may be used for locations exceeding, 10 feet above grade as indicated on drawings.

D. Wet and Damp Locations: Use rigid steel and aluminum conduit, intermediate metal conduit and electrical metallic tubing.

E. Dry Locations:
   1. Concealed: Use rigid steel and aluminum conduit, intermediate metal conduit, and electrical metallic tubing.
   2. Exposed: Use rigid steel and aluminum conduit, intermediate metal conduit, and electrical metallic tubing.

2.2 METAL CONDUIT

A. Rigid Steel Conduit: ANSI C80.1.

B. Rigid Aluminum Conduit: ANSI C80.5.

C. Intermediate Metal Conduit (IMC): Rigid steel.

D. Fittings and Conduit Bodies: ANSI/NEMA FB 1-88; all steel fittings.

2.3 PVC COATED METAL CONDUIT

A. Description: NEMA RN 1; rigid steel conduit with external PVC coating, 20 mil thick.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1-88; steel fittings with external PVC coating to match conduit.

2.4 FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel construction.


2.5 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel construction with PVC jacket.

2.6 **ELECTRICAL METALLIC TUBING (EMT)**

A. Description: ANSI C80.3; galvanized tubing.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1-88; steel or malleable iron, compression indenter type.

2.7 **NONMETALLIC CONDUIT**

A. Description: NEMA TC 2; Schedule 40 PVC.

B. Fittings and Conduit Bodies: NEMA TC 3.

2.8 **NONMETALLIC TUBING**

A. Description: NEMA TC 2.

B. Fittings and Conduit Bodies: NEMA TC 3.

**PART 3 - EXECUTION**

3.1 **INSTALLATION**

A. Install conduit in accordance with NECA "Standard of Installation."

B. Install nonmetallic conduit in accordance with manufacturer's instructions.

C. Arrange supports to prevent misalignment during wiring installation.

D. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

E. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.

F. Fasten conduit supports to building structure and surfaces under provisions of Section 16190.

G. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

H. Do not attach conduit to ceiling support wires.

I. Arrange conduit to maintain headroom and present neat appearance.

J. Route conduit parallel and perpendicular to walls.

K. Route conduit installed above accessible ceilings parallel and perpendicular to walls.

L. Route conduit under slab from point-to-point.

M. Do not cross conduits in slab.

N. Maintain adequate clearance between conduit and piping.
O. Maintain 12-inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.

P. Cut conduit square using saw or pipe cutter; de-burr cut ends.

Q. Bring conduit to shoulder of fittings; fasten securely.

R. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

S. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

T. Install no more than equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate bends in metal conduit larger than 2-inch size.

U. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

V. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic, control and expansion joints.

W. Provide suitable pull string in each empty conduit except sleeves and nipples.

X. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

Y. Ground and bond conduit under provisions of Section 16170.

Z. Identify conduit under provisions of Section 16195.

3.2 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods under the provisions of Division 7.

B. Route conduits through roof openings for piping and ductwork or through suitable roof jack with pitch pocket.

END OF SECTION
SECTION 16123

BUILDING WIRE AND CABLE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Building wire and cable.
B. Underground feeder and branch circuit cable.
C. Wiring connectors and connections.

1.2 REFERENCES

A. CEC – California Electrical Code.

1.3 SUBMITTALS

A. Submit under provisions of Division 1.
B. Product Data: Provide for each cable assembly type.
C. Test Reports: Indicate procedures and values obtained.
D. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors.
E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum ten years documented experience.

1.5 REGULATORY REQUIREMENTS

A. Conform to requirements of CEC – California Electrical Code.
B. Furnish products listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.6 FIELD SAMPLES

A. Provide under provisions of Division 1.
B. Submit two lengths, each 18 inches of cable assembly from each reel.
C. Select each length to include complete set of manufacturer markings.
D. Attach tag indicating cable size and application information.
1.7 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.
B. Conductor sizes are based on copper.
C. Aluminum conductors shall not be used.
D. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet Project Conditions.
E. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

1.8 COORDINATION

A. Coordinate Work under provisions of Division 1.
B. Determine required separation between cable and other work.
C. Determine cable routing to avoid interference with other work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS - BUILDING WIRE AND CABLE

A. General Cable
B. South Wire Cable
C. Anixter Cable
D. Substitutions: Under provisions of Division 1.

2.2 BUILDING WIRE AND CABLE

A. Description: Single conductor insulated wire.
B. Conductor: Copper.
C. Insulation Voltage Rating: 600 volts.
D. Insulation: CEC – California Electrical Code; Type THHN/THWN or XHHN insulation for feeders and branch circuits.

2.3 MANUFACTURERS - UNDERGROUND FEEDER AND BRANCH-CIRCUIT CABLE

A. Substitutions: Under provisions of Division 1.

2.4 UNDERGROUND FEEDER AND BRANCH CIRCUIT CABLE

A. Description: CEC – California Electrical Code, Type UF.
B. Conductor: Copper.
C. Insulation Voltage Rating: 600 volts.
D. Insulation Temperature Rating: 90 degrees C.

2.5 WIRING Connectors

A. Split Bolt Connectors:
   1. Ilsco, Model SK
   2. Burndy, Model KSU
   3. Blackburn, Model HPS

B. Solderless Pressure Connectors:
   1. Ilsco, Model SLUH
   2. Burndy, Model KA-U
   3. Panduit, Model LAM

C. Spring Wire Connectors:
   1. Buchanan, Models 31, 33, 35 and 37
   2. 3M
   3. Panduit

D. Compression Connectors:
   1. Burndy, Model HYLUG, HYLINK
   2. Panduit, Model LAA
   3. Blackburn, Model ATL

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that mechanical work likely to damage wire and cable has been completed.
3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.3 WIRING METHODS

A. Concealed Dry Interior Locations: Use only building wire, Type THHN/THWN or XHHN insulation, in raceway.

B. Exposed Dry Interior Locations: Use only building wire, Type THHN/THWN or XHHN insulation, in raceway.

C. Above Accessible Ceilings: Use only building wire, Type THHN/THWN or XHHN insulation, in raceway.

D. Wet or Damp Interior Locations: Use only building wire, Type THHN/THWN or XHHN insulation, in raceway.

E. Exterior Locations: Use only building wire, Type XHHW insulation, in raceway.

F. Underground Installations: Use only building wire, Type XHHW insulation, in raceway.

G. Use wiring methods indicated on Drawings.

3.4 INSTALLATION

A. Install products in accordance with manufacturers instructions.

B. Use solid conductor for feeders and branch circuits 10 AWG and smaller.

C. Use stranded conductors for control circuits.

D. Use conductor not smaller than 12 AWG for power and lighting circuits.

E. Use conductor not smaller than 16 AWG for control circuits.

F. Use 10 AWG conductors for 20 ampere, 120-volt branch circuits longer than 75 feet.

G. Use 10 AWG conductors for 20 ampere, 277-volt branch circuits longer than 200 feet.

H. Pull all conductors into raceway at same time.

I. Use suitable wire pulling lubricant for building wire 4 AWG and larger.

J. Protect exposed cable from damage.

K. Support cables above accessible ceiling, using spring metal clips or metal or plastic cable ties to support cables from structure. Do not rest cable on ceiling panels.

L. Use suitable cable fittings and connectors.

M. Neatly train and lace wiring inside boxes, equipment, and panelboards.

N. Clean conductor surfaces before installing lugs and connectors.
O. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

P. Terminate aluminum conductors with tin-plated aluminum-bodied compression connectors only. Fill with anti-oxidant compound before installing conductor.

Q. Use suitable reducing connectors or mechanical connector adaptors for connecting aluminum conductors to copper conductors.

R. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

S. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.

T. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

U. Color code control wire insulation and label each termination.

V. Conductor Identification: All secondary branch circuit constructed (no 10 AWG and smaller) throughout the project shall be provided with color coded insulation as follows:

208Y/120V

<table>
<thead>
<tr>
<th>Phase A</th>
<th>Phase B</th>
<th>Phase C</th>
<th>Natural</th>
<th>Ground</th>
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<tbody>
<tr>
<td>Black</td>
<td>Red</td>
<td>Blue</td>
<td>White</td>
<td>Green</td>
</tr>
</tbody>
</table>

480/277V

<table>
<thead>
<tr>
<th>Phase A</th>
<th>Phase B</th>
<th>Phase C</th>
<th>Natural</th>
<th>Ground</th>
</tr>
</thead>
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<tr>
<td>Brown</td>
<td>Orange</td>
<td>Yellow</td>
<td>Grey</td>
<td>Green</td>
</tr>
</tbody>
</table>

3.5 INTERFACE WITH OTHER PRODUCTS

A. Identify wire and cable under provisions of Section 16195.

B. Identify each conductor with its circuit number or other designation indicated on Drawings.

3.6 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Division 1.

B. Inspect wire and cable for physical damage and proper connection.

C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.

D. Verify continuity of each branch circuit conductor.

END OF SECTION
SECTION 16130

BOXES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Wall and ceiling outlet boxes.
B. Pull and junction boxes.

1.2 REFERENCES

B. ANSI/NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports.
C. ANSI/NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.
D. CEC – California Electrical Code.
E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.3 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 1.
B. Accurately records actual locations and mounting heights of outlet, pull and junction boxes.

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of CEC – California Electrical Code.
B. Furnish products listed and classified by Underwriters Laboratories Inc. or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.5 PROJECT CONDITIONS

A. Verify field measurements are as shown on Drawings.
B. Verify locations of floor boxes and outlets in offices and work areas prior to rough in.
C. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose. Include installation within 10 feet of location shown.

PART 2 - PRODUCTS

2.1 OUTLET BOXES

A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1; galvanized steel.

1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2-inch male fixture studs where required.
2. Concrete Ceiling Boxes: Concrete type.

B. Nonmetallic Outlet Boxes: ANSI/NEMA OS 2.

C. Cast Boxes: NEMA FB 1, Type FD, aluminum or cast ferroalloy. Provide gasketed cover by box manufacturer. Provide threaded hubs.

2.2 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: ANSI/NEMA OS 1; galvanized steel.

B. Surface-Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface-mounted junction box.
   1. Material: Galvanized cast iron or cast aluminum.
   2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements.

B. Install electrical boxes to maintain headroom and to present neat mechanical appearance.

C. Install pullboxes and junction boxes above accessible ceiling and in unfinished areas only.

D. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

E. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods under the provisions of Section 07841.

F. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.

G. Use flush mounting outlet boxes in finished area.

H. Do not install flush mounting boxes back-to-back in walls; provide minimum 6-inch separation. Provide minimum 24 inches separation in acoustic rated walls.

I. Secure flush mounting boxes to interior wall and partition studs. Accurately position to allow for surface finish thickness.

J. Use stamped steel bridges to fasten flush mounting outlet box between studs.

K. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

L. Use adjustable steel channel fasteners for hung ceiling outlet box.

M. Do not fasten boxes to ceiling support wires.

N. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits, both supported within 12 inches of box.
O. Use gang boxes where more than one device is mounted together. Do not use sectional boxes.

P. Use gang box with plaster ring for single device outlets.

Q. Use cast outlet boxes in exterior locations exposed to the weather and wet locations.

R. Set floor boxes level.

S. Large Pullboxes: Boxes larger than 100 cubic inches in volume or 12 inches in any dimension.
   1. Interior Dry Locations: Use hinged enclosure under provisions of Section 16160.
   2. Other Locations: Use surface-mounted cast metal box.

3.2 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations and sizes of required access doors with Division 8.

B. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

C. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

D. Position outlets to locate luminaires as shown on reflected ceiling plans.

3.3 ADJUSTING

A. Adjust flush-mounting outlets to make front flush with finished wall material.

B. Install knockout closure in unused box opening.

END OF SECTION
SECTION 16140

WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Wall switches.
B. Receptacles.
C. Device plates and decorative box covers.

1.2 REFERENCES

A. NECA - Standard of Installation.
B. NEMA WD 1 - General Requirements for Wiring Devices.
C. NEMA WD 6 - Wiring Device -- Dimensional Requirements.
D. CEC – California Electrical Code.

1.3 SUBMITTALS FOR REVIEW

A. Division 1 - Submittals: Procedures for submittals.
B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.4 SUBMITTALS FOR INFORMATION

A. Division 1 - Submittals: Submittals for information.
B. Submit manufacturer's installation instructions.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

1.6 REGULATORY REQUIREMENTS

A. Conform to requirements of CEC.
B. Provide Products listed and classified by Underwriters Laboratories, Inc., or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.7 EXTRA MATERIALS

A. Division 1 - Contract Closeout and Operation and Maintenance Data.
B. Furnish two of each style, size, and finish wall plate.
PART 2 - PRODUCTS

2.1 WALL SWITCHES

A. Single Pole Switch:
   1. Hubbell, Model #1221.
   2. Pass & Seymour, Model #20AC1.

B. Double Pole Switch:
   1. Hubbell, Model #1222.
   2. Pass & Seymour, Model #20AC2.

C. Three-way Switch:
   1. Hubbell, Model #1223.
   2. Pass & Seymour, Model #20AC3.

D. Substitutions: Refer to Division 1.

E. Description: NEMA WD 1, Heavy-Duty, AC only general-use snap switch.

F. Body and Handle: White plastic with toggle handle.

G. Ratings:
   1. Voltage: 120-277 volts, AC.
   2. Current: 20 amperes or match branch circuit and load characteristics.

2.2 RECEPTACLES

A. Single Convenience Specification Grade Receptacle:
   1. Hubbell, Model #8310.
   2. Pass & Seymour, Model #5361.
   3. Arrow-Hart, Model #5361.

B. GFCI Receptacle: (Specification Grade)
   1. Hubbell, Model #GF8300-I.

C. Specification Grade Receptacle:
1. Hubbell, Model #8300.
2. Pass & Seymour, Model #9300-HG-BK.
3. Arrow-Hart, Model #8300.

D. Substitutions: Refer to Division 1.

2.3 WALL PLATES

A. Decorative Cover Plate: Smooth stainless steel.
   1. Substitutions: Refer to Division 1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 1 - Coordination and Meetings: Verification of existing conditions prior to beginning work.
B. Verify that outlet boxes are installed at proper height.
C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.
B. Clean debris from outlet boxes.

3.3 INSTALLATION

A. Install in accordance with NECA "Standard of Installation."
B. Install devices plumb and level.
C. Install switches with OFF position down.
D. Install receptacles with grounding pole on top.
E. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
F. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
G. Connect wiring devices by wrapping conductor around screw terminal.
H. Use jumbo size plates for outlets installed in masonry walls.
I. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

3.4 INTERFACE WITH OTHER PRODUCTS
A. Coordinate locations of outlet boxes provided under Section 16130 to obtain mounting heights specified and indicated on drawings.

B. Install wall switch 48 inches above finished floor.

C. Install convenience receptacle 18 inches above finished floor.

D. Install convenience receptacle 6 inches above counter or backsplash of counter.

3.5 FIELD QUALITY CONTROL

A. Division 1 - Quality Control and Starting of Systems: Field inspection, testing, adjusting, and balancing.

B. Inspect each wiring device for defects.

C. Operate each wall switch with circuit energized and verify proper operation.

D. Verify that each receptacle device is energized.

E. Test each receptacle device for proper polarity.

F. Test each GFCI receptacle device for proper operation.

3.6 ADJUSTING

A. Division 1 - Contract Closeout and Starting of Systems: Adjusting installed work.

B. Adjust devices and wall plates to be flush and level.

3.7 CLEANING

A. Division 1 - Contract Closeout: Cleaning installed work.

B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION
SECTION 16190

SUPPORTING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Conduit and equipment supports.
B. Anchors and fasteners.

1.2 REFERENCES

A. NECA - National Electrical Contractors Association.
B. CEC – California Electrical Code.

1.3 SUBMITTALS

A. Submit under provisions of Division 1.
B. Product Data: Provide manufacturer's catalog data for fastening systems.
C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of CEC – California Electrical Code.
B. Furnish products listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.1 PRODUCT REQUIREMENTS

A. Materials and Finishes: Provide adequate corrosion resistance, electro-galvanized.
B. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products.
C. Anchors and Fasteners:
   1. Concrete Structural Elements: Use precast insert system, expansion anchors, powder-actuated anchors and preset inserts.
   2. Steel Structural Elements: Use beams clamps with seismic safety strap, spring steel clips, steel ramset fasteners, and welded fasteners.

5. Solid Masonry Walls: Use expansion anchors and preset inserts.


2.2 STEEL CHANNEL

A. Manufacturer:
   1. B-Line
   2. Unistrut
   3. Panduit

B. Description: Electro-Galvanized steel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation".

C. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.

D. Do not use spring steel clips and clamps.

E. Obtain permission from Architect before using powder-actuated anchors.

F. Obtain permission from Architect before drilling or cutting structural members.

G. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.

H. Install surface-mounted cabinets and panelboards with minimum of four anchors.

I. In wet and damp locations uses steel channel supports to stand cabinets and panelboards one inch off wall.

J. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

END OF SECTION
SECTION 16195

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Nameplates and labels.
B. Wire and cable markers.

1.2 REFERENCES

A. CEC – California Electrical Code.

1.3 SUBMITTALS

A. Submit under provisions of Division 1.
B. Product Data: Provide catalog data for nameplates, labels, and markers.
C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under regulatory requirements. Include instructions for storage, handling, protection, examination, preparation and installation of Product.

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of CEC – California Electrical Code.
B. Furnish products listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.5 EXTRA MATERIALS

A. Furnish under provisions of Division 1.

PART 2 - PRODUCTS

2.1 NAMEPLATES AND LABELS

A. Nameplates: Engraved three-layer laminated plastic, black letters on white background.
B. Locations:
   1. Each electrical distribution and control equipment enclosure.
   2. Communication cabinets.
C. Letter Size:
   1. Use 1/8-inch letters for identifying individual equipment and loads.
   2. Use 1/4-inch letters for identifying grouped equipment and loads.
D. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background. Use only for identification of individual wall switches and receptacles, and control device stations.

2.2 WIRE MARKERS

A. Description: Tape, split sleeve, or tubing type wire markers.

B. Locations: Each conductor at panelboard gutters, pull boxes, disconnects, outlet and junction boxes, and each load connection. Each conductor in manhole and distribution switchboards.

C. Legend:

1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.

2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on drawings or shop drawings.

3. Medium Voltage Loops/Feeders: Loop number, voltage, load description and size of conductors with weatherproof tag markers.

PART 3 - EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive nameplates and labels.

3.2 APPLICATION

A. Install nameplate and label parallel to equipment lines.

B. Secure nameplate to equipment front using screws, rivets, or adhesive.

C. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations, and outside surface of door on panelboard installed in unfinished or utility room locations.

D. Secure weatherproof cable tags in manholes and HV switches near or on accessible, easy to read locations.

END OF SECTION
SECTION 16440
DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Disconnect switches.
B. Fuses.
C. Enclosures.

1.2 REFERENCES

A. ANSI/UL 198C - High-Interrupting Capacity Fuses; Current Limiting Types.
B. ANSI/UL 198E - Class R Fuses.
C. FS W-F-870 - Fuseholders (For Plug and Enclosed Cartridge Fuses).
D. FS W-S-865 - Switch, Box, (Enclosed), Surface-Mounted.
E. NEMA KS 1 - Enclosed Switches.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - DISCONNECT SWITCHES

A. Square D.
B. Westinghouse.
C. Siemens ITE.
D. General Electric.

2.2 DISCONNECT SWITCHES

A. Fusible Switch Assemblies: NEMA KS 1; FS W-S-865; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: FS W-F-870.

B. Nonfusible Switch Assemblies: NEMA KS 1; Type HD; FS W-S-865; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.

C. Enclosures: NEMA KS 1; Type 1, for interior dry locations; Type 3R for exterior or wet locations.

D. Switch Ratings: Number of poles, voltage, current and horsepower rating as required for particular installation.
2.3 ACCEPTABLE MANUFACTURERS - FUSES

A. Littelfuse.
B. Gould Shawmut.
C. Bussman.

2.4 FUSES

A. Fuses 600 Amperes and Less: ANSI/UL 198C, Class J; ANSI/UL 198E, Class RK1; current limiting, one-time fuse, 250, 600 volt.
B. Interrupting Rating: 200,000 rms amperes.
C. Size fuses based on motor nameplate rating.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install disconnect switches where indicated on Drawings.
B. Install fuses in fusible disconnect switches, otherwise required by Code.
C. Properly align switches and support independent of the connecting raceway.

END OF SECTION
SECTION 16485

CONTACTORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. General purpose contactors.
B. Lighting contactors.

1.2 REFERENCES

A. ANSI/NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
B. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.
C. California Electrical Code.

1.3 SUBMITTALS

A. Submit under provisions of Division 1.
B. Product Data: Include dimensions, size, voltage ratings and current ratings.
C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.4 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 1.
B. Accurately record actual locations of each contactor and indicate circuits controlled.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 1.
B. Maintenance Data: Include instructions for replacing and maintaining coil and contacts.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years documented experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of CEC.
B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.
PART 2 - PRODUCTS

2.1 MANUFACTURERS - GENERAL PURPOSE CONTACTORS

A. Square D, General Electric, Siemens

B. Substitutions: Under provisions of Division 1.

2.2 GENERAL PURPOSE CONTACTORS

A. Description: NEMA ICS 2, AC general-purpose magnetic contactor.

B. Coil Voltage: 120 volts, 60 Hertz or as indicated on drawings.

C. Poles: Four or as indicated on drawings.

D. Size: 1 or as indicated on drawings.

E. Enclosure: ANSI/NEMA ICS 6, Type 1 for indoors or Type 3R for outdoors or as indicated on drawings.

F. Accessories:
   1. Pushbutton: ON/OFF.
   2. Selector Switch: ON/OFF/AUTOMATIC.
   3. Indicating Light: RED.
   4. Auxiliary Contacts: Two normally open field convertible.

2.3 LIGHTING CONTACTORS

A. Description: NEMA ICS 2, magnetic lighting contactor.

B. Configuration: Electrically held.

C. Coil Voltage: 120 volts, 60 Hertz or as indicated on drawings.

D. Poles: Four or as indicated on drawings.

E. Contact Rating: 30 amperes.

F. Enclosure: ANSI/NEMA ICS 6, Type 1 for indoors or Type 3R for outdoors or as indicated on drawings.

G. Accessories:
   1. Pushbutton: ON/OFF.
   2. Selector Switch: ON/OFF/AUTOMATIC.
   3. Indicating Light: RED.
   4. Auxiliary Contacts: Two normally open field convertible.
2.5 ACCESSORIES

A. Pushbuttons and Selector Switches: NEMA ICS 2, heavy-duty type.
B. Indicating Lights: NEMA ICS 2, push-to-test type.
C. Auxiliary Contacts: NEMA ICS 2, Class A300.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

END OF SECTION
SECTION 16510

INTERIOR LUMINAIRES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Interior luminaires and accessories.
B. Emergency lighting units.
C. Exit signs.
D. Ballasts.
E. Fluorescent lamp emergency power supply.
F. Lamps.
G. Luminaire accessories.

1.2 RELATED SECTIONS

A. Section 16130 - Boxes.

1.3 REFERENCES

A. ANSI C78.379 - Electric Lamps - Incandescent and High-Intensity Discharge Reflector Lamps - Classification of Beam Patterns.
B. ANSI C82.1 - Ballasts for Fluorescent Lamps - Specifications.
C. ANSI C82.4 - Ballasts for High-Intensity Discharge and Low Pressure Sodium Lamps (Multiple Supply Type).
D. California Electrical Code.
F. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.4 SUBMITTALS

A. Submit under provisions of Division 1.
B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
C. Product Data: Provide dimensions, ratings, and performance data.
D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.
E. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.5 PROJECT RECORD DOCUMENTS
A. Submit under provisions of Division 1.
B. Accurately record actual locations of each luminaire.

1.6 OPERATION AND MAINTENANCE DATA
A. Submit under provisions of Division 1.
B. Maintenance Data: Include replacement parts list.

1.7 QUALIFICATIONS
A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years documented experience.

1.8 REGULATORY REQUIREMENTS
A. Conform to requirements of CEC.
B. Conform to requirements of NFPA 101.
C. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.9 EXTRA MATERIALS
A. Furnish under provisions of Division 1.
B. Provide two of each plastic lens.
C. Provide one replacement lamp for each lamp installed.
D. Provide two of each ballast type.

PART 2 - PRODUCTS

2.1 LUMINAIRES
A. Furnish products as specified in schedule on Drawings.
B. Substitutions: Under provisions of Division 1.
C. Install ballasts, lamps, and specified accessories at factory.

2.2 EXIT SIGNS
A. Description: Exit sign fixture.
B. Housing: As indicated on drawings.
C. Face: As indicated on drawings.

D. Directional Arrows: As indicated, universal type for field adjustment.

E. Mounting: As indicated, universal, for field selection.

2.3 BALLASTS

A. Fluorescent Ballast:
   1. Substitutions: Under provisions of Section 01600.
   2. Description: ANSI C82.1, high power factor type electronic ballast.
   3. Provide ballast suitable for lamps specified.
   4. Voltage: Match luminaire voltage.
   5. Source Quality Control: Certify ballast design and construction by Certified Ballast Manufacturers, Inc.

2.4 FLUORESCENT LAMP EMERGENCY POWER SUPPLY

A. Manufacturers:
   1. Bodine

B. Description: Emergency battery power supply suitable for installation in ballast compartment of fluorescent luminaire.

C. Lamp Ratings: One F32CW lamp providing 1200 lumens, minimum.

D. Battery: Sealed lead calcium type, rated for 10-year life.

E. Include TEST switch and AC ON indicator light, installed to be operable and visible from the outside of an assembled luminaire.

2.5 LAMPS

A. Incandescent Lamp Manufacturers:
   1. Phillips, Sylvania
   2. Substitutions: Under provisions of Division 1

B. Fluorescent Lamp Manufacturers:
   1. Phillips, Sylvania

C. High Intensity Discharge (HID) Lamp Manufacturers:
1. Phillips, Sylvania


D. Provide lamp type specified for luminaire.

E. Reflector Lamp Beam Patterns: ANSI C78.379.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrate and supporting grids for luminaires.

B. Examine each luminaire to determine suitability for lamps specified.

3.2 INSTALLATION

A. Install in accordance with manufacturers instructions.

B. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.

C. Support luminaires independent of ceiling framing.

D. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.

E. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prohibit movement.

F. Exposed Grid Ceilings: Support surface mounted luminaires on grid ceiling directly from building structure and provide auxiliary members spanning ceiling Ts.

G. Install recessed luminaires to permit removal from below.

H. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.

I. Install clips to secure recessed grid-supported luminaires in place.

J. Install wall mounted luminaires, emergency lighting units and exit signs at height as indicated on Drawings.

K. Install accessories furnished with each luminaire.

L. Connect luminaires, emergency lighting units and exit signs to branch circuit outlets provided under Section 16130.

M. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

N. Bond products and metal accessories to branch circuit equipment grounding conductor.

O. Install specified lamps in each luminaire, emergency lighting unit and exit sign.
3.3 FIELD QUALITY CONTROL

A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.4 ADJUSTING

A. Adjust Work under provisions of Division 1.

B. Aim and adjust luminaires as indicated on Drawings and as directed.

C. Adjust exit sign directional arrows as indicated.

D. Relamp luminaires that have failed lamps at Substantial Completion.

3.5 CLEANING

A. Clean Work under provisions of Division 1.

B. Clean electrical parts to remove conductive and deleterious materials.

C. Remove dirt and debris from enclosure.

D. Clean photometric control surfaces as recommended by manufacturer.

E. Clean finishes and touch up damage.

3.6 DEMONSTRATION

A. Provide systems demonstration under provisions of Section 01650.

B. Provide minimum of two hours demonstration of luminaire operation.

END OF SECTION
SECTION 16721

FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 SUMMARY NETWORK FIRE ALARM SYSTEM (EXISTING)

A. The existing Fire Alarm System shall be networked via multimode fiber and report to the Simplex Network Display Unit (NDU) as located on the Fire Alarm plans. Existing third party systems are to report trouble and alarm on the Simplex NDU until they are retrofitted. New Fire Alarm Control Panels (FACP) (4100U Nodes), shall fully annunciate at the Simplex 4100U NDU.

B. Existing network fire alarm control panels shall include all features as described in this specification and shall have network communication capabilities as described herein.

1. All points monitored and controlled by a single node shall be capable of being programmed as "Public". Each point made public to the network may be programmed to be operated by any other node connected to the network.

2. Network communications shall be capable of supporting "point lists" that can be handled as though they were a single point.

C. The existing network shall provide a means to log into any node on the system via the NDU or laptop computer and have complete network access for diagnostics, maintenance reporting, and information gathering of all nodes in the system. Systems not meeting this requirement must provide all diagnostic tools required to support this function from selected points on the network. This Section covers fire alarm systems, including initiating devices, notification appliances, controls, and supervisory devices.

D. Existing work covered by this section includes the furnishing of labor, equipment, and materials for installation of the fire alarm system as indicated on the drawings and specifications.

E. The existing Fire Alarm System shall consist of all necessary hardware equipment and software programming to perform the following functions:

1. Fire alarm system detection and addressable notification operations or as per noted on fire alarm plans.

2. Control and monitoring of elevators, door hold-open devices, fire suppression systems, emergency power systems, and other equipment as indicated in the drawings and specifications.


1.2 SCOPE OF WORK

A. Existing scope of work to read as:

1. Fire Life safety system on a peer-to-peer token ring. The system shall use Nodes (networked fire alarm control panels) or as noted on plans, per each of buildings or areas indicated on the construction plans. The design shall include automatic initiating devices as noted on plans, addressable technology at both the initiating and the notification circuits, point by point indication of events annunciated and recorded at the NDU. All new Nodes shall work independently of each other and shall receive and transmit data to the NDU.
B. Provide additional duct detector and connect to existing fire alarm control panel.

1.3 ACCEPTABLE EQUIPMENT AND SERVICE PROVIDERS

A. Manufacturers: The equipment and service described in this specification are those supplied and supported by Simplex Grinnell.

Simplex Grinnell
900 Allen Avenue
Glendale, CA
818 247 1199

B. Being listed as an acceptable Manufacturer in no way relieves obligation to provide all equipment and features in accordance with these specifications.

C. The equipment and service provider shall be a nationally recognized company specializing in fire alarm and detection systems. This provider shall employ factory trained and certified technicians, and shall maintain a service organization within 20 miles of this project location. The equipment and service provider shall have a minimum of 25 years experience in the fire protective signaling systems industry.

1.4 SYSTEM DESCRIPTION

A. General: Provide a complete, addressable, microprocessor-based fire alarm system with initiating devices, notification appliances, and monitoring and control devices as indicated on the drawings and as specified herein.

B. History Logs: The system shall provide a means to recall alarms and trouble conditions in chronological order for the purpose of recreating an event history. A separate alarm and trouble log shall be provided.

C. Recording of Events: Record all alarm, supervisory, and trouble events by means of system printer. The printout shall include the type of signal (alarm, supervisory, or trouble) the device identification, date and time of the occurrence. The printout differentiates alarm signals from all other printed indications.

D. Network communication:

1. The network shall be multi-mode fiber.

2. Network node communication shall be through a token ring, hub, or star topology configuration, or combination thereof.

3. A single open, ground or short on the network communication loop shall not degrade network communications. Token shall be passed in opposite direction to maintain communications throughout all network nodes. At the same time the status of the communication link shall be reported.

4. If a group of nodes becomes isolated from the rest of the network due to multiple fault conditions, that group shall automatically form a sub-network with all common interaction of monitoring and control remaining intact. The network shall be notified with the exact details of the lost communications.

5. The communication method shall be per NFPA 72.
E. Required Functions: The following are required system functions and operating features of the specified Simplex 4100U FACP:

1. Priority of Signals: Fire alarm events have highest priority. Subsequent alarm events are queued in the order received and do not affect existing alarm conditions. Priority Two, Supervisory and Trouble events have second, third, and fourth-level priority, respectively. Signals of a higher-level priority take precedence over signals of lower priority even though the lower-priority condition occurred first. Annunciate all events regardless of priority or order received.

2. Noninterfering: An event on one zone does not prevent the receipt of signals from any other zone. All zones are manually resettable from the FACP after the initiating device or devices are restored to normal. The activation of an addressable device does not prevent the receipt of signals from subsequent addressable device activations.

3. Transmission to an approved Supervising Station: Automatically route alarm, supervisory, and trouble signals to an approved supervising station service provider, under another contract.

4. Annunciation: Operation of alarm and supervisory initiating devices shall be annunciated at the FACP and the remote annunciator, indicating the type of device, the operational state of the device (i.e. alarm, trouble or supervisory) and shall display the custom label associated with the device.

5. Selective Alarm: A system alarm shall include:
   a. Indication of alarm condition at the FACP and the annunciator(s).
   b. Identification of the device that is the source of the alarm at the FACP and the annunciator(s).
   c. Operation of audible and visible notification appliances until silenced at FACP.
   d. Selectively closing doors normally held open by magnetic door holders on the fire floor, floor above and floor below.
   e. Unlocking designated doors.
   f. Shutting down supply and return fans serving zone where alarm is initiated.
   g. Capable of transmission of signal to the supervising station.

6. Supervisory Operations: Upon activation of a supervisory device such as a [fire pump power failure,][low air pressure switch, and][none] tamper switch, the system shall operate as follows:
   a. Activate the system supervisory service audible signal and illuminate the LED at the control unit and the remote annunciator.
   b. Pressing the Supervisory Acknowledge Key will silence the supervisory audible signal while maintaining the Supervisory LED "on" indicating off-normal condition.
   c. Record the event in the FACP historical log.
   d. Transmission of supervisory signal to the supervising station.
e. Restoring the condition shall cause the Supervisory LED to clear and restore the system to normal.

7. Alarm Silencing: If the "Alarm Silence" button is pressed, all audible alarm signals shall cease operation.

8. System Reset:
   a. The "System Reset" button shall be used to return the system to its normal state. Display messages shall provide operator assurance of the sequential steps ("IN PROGRESS", "RESET COMPLETED") as they occur. The system shall verify all circuits or devices are restored prior to resetting the system to avoid the potential for re-alarming the system. The display message shall indicate "ALARM PRESENT, SYSTEM RESET ABORTED."
   b. Should an alarm condition continue, the system will remain in an alarmed state.

9. A manual evacuation (drill) switch shall be provided to operate the notification appliances without causing other control circuits to be activated.

10. WALKTEST: The system shall have the capacity of 8 programmable passcode protected one person testing groups, such that only a portion of the system need be disabled during testing. The actuation of the "enable one person test" program at the control unit shall activate the "One Person Testing" mode of the system as follows:
   a. The city circuit connection and any suppression release circuits shall be bypassed for the testing group.
   b. Control relay functions associated with one of the 8 testing groups shall be bypassed.
   c. The control unit shall indicate a trouble condition.
   d. The alarm activation of any initiating device in the testing group shall cause the audible notification appliances assigned only to that group to sound a code to identify the device or zone.
   e. The unit shall automatically reset itself after signaling is complete.
   f. Any opening of an initiating device or notification appliance circuit wiring shall cause the audible signals to sound for 4 seconds indicating the trouble condition.

F. Analog Smoke Sensors and Bases:

1. Monitoring: FACP shall individually monitor sensors for calibration, sensitivity, and alarm condition, and shall individually adjust for sensitivity. The control unit shall determine the condition of each sensor by comparing the sensor value to the stored values.

2. Environmental Compensation: The FACP shall maintain a moving average of the sensor's smoke chamber value to automatically compensate for dust, dirt, and other conditions that could affect detection operations.

3. Programmable Sensitivity: Photoelectric Smoke Sensors shall have 7 selectable sensitivity levels ranging from 0.2% to 3.7%, programmed and monitored from the FACP.
4. Sensitivity Testing Reports: The FACP shall provide sensor reports that meet NFPA 72 calibrated test method requirements. The reports shall be viewed on a CRT Display or printed for annual recording and logging of the calibration maintenance schedule.

5. The FACP shall automatically indicate when an individual sensor needs cleaning. The system shall provide a means to automatically indicate when a sensor requires cleaning. When a sensor's average value reaches a predetermined value, (3) progressive levels of reporting are provided. The first level shall indicate if a sensor is close to a trouble reporting condition and will be indicated on the FACP as "ALMOST DIRTY." This condition provides a means to alert maintenance staff of a sensor approaching dirty without creating a trouble in the system. If this indicator is ignored and the second level is reached, a "DIRTY SENSOR" condition shall be indicated at the FACP and subsequently a system trouble is reported [to the Supervising Station][none]. The sensor base LED shall glow steady giving a visible indication at the sensor location. The "DIRTY SENSOR" condition shall not affect the sensitivity level required to alarm the sensor. If a "DIRTY SENSOR" is left unattended, and its average value increases to a third predetermined value, an "EXCESSIVELY DIRTY SENSOR" trouble condition shall be indicated at the control unit.

6. The FACP shall continuously perform an automatic self-test on each sensor that will check sensor electronics and ensure the accuracy of the values being transmitted. Any sensor that fails this test shall indicate a "SELF TEST ABNORMAL" trouble condition.

7. Multi-Sensors shall combine photoelectric smoke sensing and heat sensing technologies. An alarm shall be determined by either smoke detection, with selectable sensitivity from 0.2 to 3.7 %/ft obscuration; or heat detection, selectable as fixed temperature or fixed with selectable rate-of-rise; or based on an analysis of the combination of smoke and heat activity.

8. Programmable bases. It shall be possible to program relay and sounder bases to operate independently of their associated sensor.

9. Magnet test activation of smoke sensors shall be distinguished by its label and history log entry as being activated by a magnet.

1.5 SUBMITTALS

A. General: Submit the following according to Conditions of Contract.

1. Wiring diagrams from manufacturer.

2. Shop drawings showing system details including location of FACP, all devices, circuiting and details of the NDU.

3. System power and battery charts with performance graphs and voltage drop calculations to assure that the system will operate in accordance with the prescribed backup time periods and under all voltage conditions per UL and NFPA standards.

4. System operation description including method of operation and supervision of each type of circuit and sequence of operations for all manually and automatically initiated system inputs and outputs. A list of all input and output points in the system shall be provided with a label indicating location or use of IDC, SLC, NAC, relay, sensor, and auxiliary control circuits.

5. Operating instructions for FACP.

6. Operation and maintenance data for inclusion in Operating and Maintenance Manual. Include data for each type product, including all features and operating sequences, both automatic and manual. Provide the names, addresses, and telephone numbers of service organizations.
7. Product certification signed by the manufacturer of the fire alarm system components certifying that their products comply with indicated requirements.

8. Record of field tests of system.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A SimplexGrinnell approved installer is to perform the work of this section.

B. Each and every item of the Fire Alarm System shall be listed under the appropriate category by Underwriters Laboratories, Inc. (UL), and shall bear the "UL" label.

PART 2 - PRODUCTS

2.1 FIRE ALARM CONTROL PANEL “FACP” (EXISTING)

A. General: Comply with UL 864, "Control Units and Accessories for Fire Alarm Systems". The fire alarm control panel shall be SimplexGrinnell model 4100U network NODE, CSFM # 7170-0026:251

B. The following FACP hardware shall be provided:

1. Power Limited base panel with beige cabinet and door, 120 VAC input power.

2. 2,000 point capacity where (1) point equals (1) monitor (input) or (1) control (output).

3. 2,000 points of Network Annunciation at FACP Display when applied as a Network Node.

4. 2000 points of annunciation where one (1) point of annunciation equals:
   a. 1 LED driver output on a graphic driver or 1 switch input on a graphic switch input module.
   b. 1 LED on panel or 1 switch on panel.

5. From all battery charging circuits in the system provide battery voltage and ammeter readouts on the FACP LCD Display.

6. Where required provide Intelligent Remote Battery Charger for charging up to 110Ah batteries.

7. Power Supplies with integral intelligent Notification Appliance Circuit Class B for system expansion.

8. Four (4) form "C" Auxiliary Relay Circuits (Form C contacts rated 2A @ 24 VDC, resistive), operation is programmable for trouble, alarm, supervisory of other fire response functions. Relays shall be capable of switching up to ½ A @ 120 VAC, inductive.

9. The FACP shall support (6) RS-232-C ports and one service port.

10. Remote Unit Interface: supervised serial communication channel for control and monitoring of remotely located annunciators and I/O panels.

11. Modular Network Communications Card.
2.2 NETWORK ANNUNCIATOR (EXISTING)

A. Network Display Unit shall contain the following features:

1. LCD display to indicate alarm, supervisory, and component status messages and shall include a keypad for use in entering and executing control commands.

2. Capacity to annunciate 12,000 network point and/or point lists.

3. Historical event logs shall maintain separate 600 Alarm and 600 Trouble events.

4. The network shall provide a means to log into any node on the system via a laptop computer or CRT/Keyboard and have complete network access (Set Host) for diagnostics, maintenance reporting, and information gathering of all nodes in the system. Systems not meeting this requirement must provide all diagnostic tools required to support this function from selected points on the network.

2.3 REMOTE LCD ANNUNCIATOR (EXISTING)

A. Provide a remote LCD Annunciator, with the same "look and feel" as the FACP operator interface. The Remote LCD Annunciator shall use the same Primary Acknowledge, Silence, and Reset Keys; Status LEDs and LCD Display as the FACP.

B. The LCD annunciator shall be SimplexGrinnell model 4606-9101. CSFM # 7120-0026:225.

2.4 ADDRESSABLE MANUAL PULL STATIONS (EXISTING)

A. Description: Addressable single or double action type, red LEXAN, with molded, raised-letter operating instructions of contrasting color. Station will mechanically latch upon operation and remain so until manually reset by opening with a key common with the control units. The manual pull station shall be SimplexGrinnell model 4099-9003. CSFM #7150-0026:224.

2.5 SMOKE SENSORS

A. General: Comply with UL 268, "Smoke Detectors for Fire Protective Signaling Systems." Include the following features:

1. Factory Nameplate: Serial number and type identification.

2. Operating Voltage: 24 VDC, nominal.

3. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore normal operation.

4. Each sensor base shall contain an LED that will flash each time it is scanned by the Control Unit (once every 4 seconds). In alarm condition, the sensor base LED shall be on steady.

5. Each sensor base shall contain a magnetically actuated test switch to provide for easy alarm testing at the sensor location.

6. Each sensor shall be scanned by the Control Unit for its type identification to prevent inadvertent substitution of another sensor type. Upon detection of a "wrong device", the control unit shall operate with the installed device at the default alarm settings for that sensor; 2.5% obscuration for photoelectric sensor, 135-deg F and 15-deg F rate-of-rise for the heat sensor, but shall indicate a "Wrong Device" trouble condition.
B. The sensor's electronics shall be immune from nuisance alarms caused by EMI and RFI. Smoke
detector sensor shall be SimplexGrinnell model 4098-9714. CSFM #7272-0026:218.

1. Sensors include a communication transmitter and receiver in the mounting base having a
unique identification and capability for status reporting to the FACP. Sensor address shall be
located in base to eliminate false addressing when replacing sensors.

2. Removal of the sensor head for cleaning shall not require the setting of addresses.

C. Type: Smoke sensors shall be of the photoelectric or combination photoelectric / heat type.

D. Bases: Relay output, sounder and isolator bases shall be supported alternatives to the standard
base. Detector sensor base shall be SimplexGrinnell model 4098-9792. CSFM # 7300-0026:217

1. Duct Smoke Sensor: Photoelectric type, with sampling tube of design and dimensions as
recommended by the manufacturer for the specific duct size and installation conditions where
applied. Sensor includes relay as required for fan shutdown. Addressable duct detector shall
be SimplexGrinnell model 4098-9756. CSFM # 3240-0026:241

2. Environmental compensation, programmable sensitivity settings, status testing, and monitoring
of sensor dirt accumulation for the duct smoke sensor shall be provided by the FACP.

3. The Duct Housing shall provide a supervised relay driver circuit for driving up to 15 relays with
a single "Form C" contact rated at 7A@ 28VDC or 10A@ 120VAC. This auxiliary relay output
shall be fully programmable. Relay shall be mounted within 3 feet of HVAC control circuit.

4. Duct Housing shall provide a relay control trouble indicator Yellow LED.

5. Duct Housing shall have a transparent cover to monitor for the presence of smoke. Cover
shall secure to housing by means of four (4) captive fastening screws.

6. Duct Housing shall provide two (2) Test Ports for measuring airflow and for testing. These
ports will allow aerosol injection in order to test the activation of the duct smoke sensor.

7. Duct Housing shall provide a magnetic test area and Red sensor status LED.

8. For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by
accessing them through the duct housing front cover.

9. Each duct smoke sensor shall have a Remote Test Station with an alarm LED and test switch.
Duct detector remote test station shall be SimplexGrinnell model 2098-9608. CSFM # 7300-
0026:150

10. Where indicated provide NEMA 4X weatherproof duct housing enclosure that shall provide for
the circulation of conditioned air around the internally mounted addressable duct sensor
housing to maintain the sensor housing at its rated temperature range. The housing shall be
UL Listed to Standard 268A. The NEMA 4X housing shall be SimplexGrinnell model 4098-
9845. CSFM # 7300-0026:245

2.6 HEAT SENSORS

A. Thermal Sensor: Combination fixed-temperature and rate-of-rise unit with plug-in base and alarm
indication lamp; 135-deg F fixed-temperature setting except as indicated.
B. Thermal sensor shall be of the epoxy encapsulated electronic design. It shall be thermistor-based, rate-compensated, self-restoring and shall not be affected by thermal lag.

C. Sensor fixed temperature sensing shall be independent of rate-of-rise sensing and) programmable to operate at 135-deg F or 155-deg F. Sensor rate-of-rise temperature detection shall be selectable at the FACP for either 15-deg F or 20-deg F per minute.

D. Sensor shall have the capability to be programmed as a utility monitoring device to monitor for temperature extremes in the range from 32-deg F to 155-deg F. The heat sensor shall be SimplexGrinnell model 4098-9733 and mount on sensor base 4098-9792. CSFM # 7270-0026:216 (base CSFM # 7300-0026:217)

2.7 ADDRESSABLE ALARM NOTIFICATION APPLIANCES (EXISTING)

A. Addressable Notification Appliances: The Contractor shall furnish and install Addressable Notification Appliances and accessories to operate on compatible signaling line circuits (SLC).

B. Addressable Notification appliance operation shall provide power, supervision and separate control of horns and strobes over a single pair of wires. The controlling channel (SLC) digitally communicates with each appliance and receives a response to verify the appliance’s presence on the channel. The channel provides a digital command to control appliance operation. SLC channel wiring shall be unshielded twisted pair (UTP), with a capacitance rating of less than 60pf/ft and a minimum 3 twists (turns) per foot.

1. Class B notification appliances shall be wired without requiring traditional in/out wiring methods; addressable "T" Tapping shall be permitted. Up to 63 appliances can be supported on a single channel.

2. Each Addressable notification appliance shall contain an electronic module and a selectable address setting to allow it to occupy a unique location on the channel. This on-board module shall also allow the channel to perform appliance diagnostics that assist with installation and subsequent test operations. A visible LED on each appliance shall provide verification of communications and shall flash with the appliances address setting when locally requested using a magnetic test tool.

C. Addressable Controller: Addressable Controller shall supervise Channel (SLC) wiring, communicate with and control addressable notification appliances. It shall be possible to program the High/Lo setting of the audible (horn) appliances by channel from the addressable controller. The Addressable controller shall be SimplexGrinnell model 4009-9401. CSFM # 7300-0026:214.

D. Horn: Addressable horn shall be listed to UL 464. Horn appliances shall have a High/Lo Setting, programmable by channel from the addressable controller or by appliance from the host FACP. The horn shall have a minimum sound pressure level of 83 or 89 dBA @ 24VDC. The horn shall mount directly to a standard single gang, double gang or 4" square electrical box, without the use of special adapter or trim rings. Appliances shall be wired with UTP conductors, having a minimum of 3 twists per foot. The addressable horn shall be SimplexGrinnell model 4901-9853. CSFM # 7135-0026:238.

E. Visible/Only: Addressable strobe shall be listed to UL 1971. The V/O shall consist of a xenon flash tube and associated lens/reflector system. The V/O enclosure shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings. Appliances shall be wired with UTP conductors, having a minimum of 3 twists per foot. V/O appliances shall be provided with different minimum flash intensities of 15cd, 75cd and 110cd. Provide a label inside the strobe lens to indicate the listed candela rating of the specific Visible/Only appliance. The visible only device shall be SimplexGrinnell model 4904-9450. CSFM # 7125-0026:235
F. Audible/Visible: Addressable combination Audible/Visible (A/V) Notification Appliances shall be listed to UL 1971 and UL 464. The strobe light shall consist of a xenon flash tube and associated lens/reflector system. Provide a label inside the strobe lens to indicate the listed candela rating of the specific strobe. The horn shall have a minimum sound pressure level of 83 or 89 dBA @ 24VDC. The audible/visible enclosure shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings. Appliances shall be wired with UTP conductors, having a minimum of 3 twists per foot. The appliance shall be capable of two-wire synchronization with one of the following options: The audible/visible device shall be SimplexGrinnell model 4903-9350. CSFM # 7125-0026:239

1. Synchronized Strobe with Horn on steady.
2. Synchronized Strobe with Temporal Code Pattern on Horn.
3. Synchronized Strobe with March Time cadence on Horn.
4. Synchronized Strobe firing to NAC sync signal with Horn silenced.

G. Isolator Module: Isolator module provides short circuit isolation for addressable notification appliance SLC wiring. Isolator shall be listed to UL 864. The isolator shall mount directly to a minimum 2 1/8" deep, standard 4" square electrical box, without the use of special adapter or trim rings. Power and communications shall be supplied by the Addressable Controller channel SLC; dual port design shall accept communications and power from either port and shall automatically isolate one port from the other when a short circuit occurs. The following functionality shall be included in the Isolator module:

1. Report faults to the host FACP.
2. On-board Yellow LED provides module status.
3. After the wiring fault is repaired, the Isolator modules shall test the lines and automatically restore the connection.

H. Accessories: The contractor shall furnish the necessary accessories. The isolator shall be SimplexGrinnell model 4905-9929. CSFM # 7300-0026:214

2.8 TRUEALERT ADDRESSABLE APPLIANCES NAC POWER EXTENDER

A. The TrueAlert Addressable Controller shall be a stand-alone panel capable of powering a minimum of 3 TrueAlert Signaling line circuits. Each channel shall be rated for 2.5 amps and support up to 63 TrueAlert addressable notification appliances. Power and communication for the notification appliances shall be provided on the same pair of wires. The Addressable controller shall be SimplexGrinnell Model 4009-9401. CSFM # 7300-0026:214.

B. Addressable SLC notification appliance circuits shall be Class B, Style 4.

C. The internal power supply & battery charger shall be capable of charging up 12.7 Ah batteries internally mounted or 18Ah batteries mounted in an external cabinet.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Install system components and all associated devices in accordance with applicable NFPA Standards and manufacturer's recommendations.
B. Installation personnel shall be supervised by persons who are qualified and experienced in the installation, inspection, and testing of fire alarm systems. Examples of qualified personnel shall include, but not be limited to, the following:

1. Factory trained and certified personnel.
2. National Institute of Certification in Engineering Technologies (NICET) fire alarm level II certified personnel.
3. Personnel licensed or certified by state or local authority.

3.2 EQUIPMENT INSTALLATION

A. Furnish and install a complete Fire Alarm System as described herein and as shown on the plans. Include sufficient control unit(s), annunciator(s), manual stations, automatic fire detectors, smoke detectors, audible and visible notification appliances, wiring, terminations, electrical boxes, and all other necessary material for a complete operating system.

B. Water-Flow and Valve Supervisory Switches: Connect for each sprinkler valve required to be supervised.

C. Install manual station with operating handle 48 inches (1.22 m) above floor. Install wall mounted audible and visual notification appliances not less than 80 inches (2.03 m) above floor to bottom of lens and not greater than 96 inches (2.44 m) above floor to bottom of lens.

D. Automatic Detector Installation: Conform to NFPA 72.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.

B. Service personnel shall be qualified and experienced in the inspection, testing, and maintenance of fire alarm systems. Examples of qualified personnel shall be permitted to include, but shall not be limited to, individuals with the following qualifications:

1. Factory trained and certified.
2. National Institute for Certification in Engineering Technologies (NICET) fire alarm certified.
3. International Municipal Signal Association (IMSA) fire alarm certified.
4. Certified by a state or local authority.
5. Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems.

C. Pretesting: Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.
D. Inspection:
   1. Inspect equipment installation, interconnection with system devices, mounting locations, and
      mounting methods.
   2. Verify that units and controls are properly installed, connected, and labeled and that
      interconnecting wires and terminals are identified.

E. Acceptance Operational Tests: Provide minimum 10 days notice of acceptance test performance
   schedule to Owner, and local Authority Having Jurisdiction.

F. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such
   deficiencies. Verify by the system test that the total system meets the Specifications and complies
   with applicable standards.

G. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test
   results in the form of a test log. Use NFPA 72 Forms for documentation.

H. Final Test, Record of Completion, and Certificate of Occupancy: Test the system as required by
   the Authority Having Jurisdiction in order to obtain a certificate of occupancy. Provide completed
   NFPA 72 Record of Completion form to Owner and AHJ.

I. Provide 8 hours of Training per the Owner's requirements.

END OF SECTION