

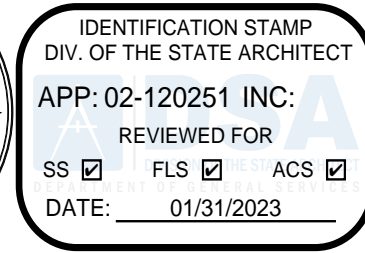
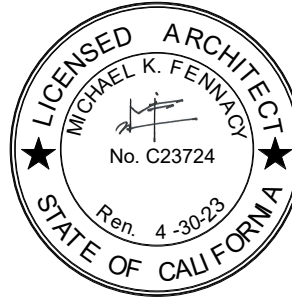
PROJECT MANUAL FOR

**MISSION OAK HIGH SCHOOL
AQUATICS COMPLEX**

**TULARE JOINT UNION HIGH SCHOOL DISTRICT
426 Blackstone
TULARE, CA 93274**

PREPARED BY:

DARDEN ARCHITECTS, INC.
ARCHITECTURE•PLANNING•INTERIORS
6790 N. WEST AVENUE
FRESNO, CALIFORNIA 93711



ARCHITECT:



STRUCTURAL ENGINEER:



MECHANICAL ENGINEER:



ELECTRICAL ENGINEER:



SWIMMING POOL:

CIVIL ENGINEER:

END OF SECTION

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Michael K Fennacy
08/21/2023

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SECTION 002213.03 – SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Supplementary Instructions to Bidders consisting of procedures and conditions for the use of documents of various types and formats for bidding of this project.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

- A. Hard Copy Format: Documents printed on paper medium.
- B. Electronic Image Format: Electronic Files consisting of Bid Documents in an image format such as PDF's, TIFF's and etc. These files are to be READ ONLY.

1.3 SUBMITTALS

- A. Submit in accordance with the following:
 - 1. Bidder's Usage Agreement for Bid Documents:
 - a. Hard Copy and Electronic Image Format Form.
 - 2. Bidder's Usage Agreement for Partial Documents.
 - a. Partial Bid Documents Form.

PART 2 - PRODUCTS
(NOT APPLICABLE)

PART 3 - EXECUTION

3.1 SCHEDULES:

- A. BIDDER'S USAGE AGREEMENT FOR BID DOCUMENTS:
 - 1. HARD COPY AND ELECTRONIC IMAGE FORMAT: When the Bid Documents are being issued electronically, the HARD COPY AND ELECTRONIC IMAGE FORMAT FORM shall be used.
 - a. This form shall be submitted and signed as a condition of receiving Bid Documents.

**SUPPLEMENTARY
INSTRUCTIONS TO BIDDERS**

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- B. BIDDER'S USAGE AGREEMENT FOR PARTIAL BID DOCUMENTS.
 - 1. When the Bidder is requesting additional documents which are part of the Bid Documents, the PARTIAL BID DOCUMENTS FORM shall be used.
 - a. This form shall be submitted and signed as a condition of receiving Partial Bid Documents.

3.2 BIDDER'S USAGE AGREEMENT FOR BID DOCUMENTS HARD COPY AND ELECTRONIC IMAGE FORMAT

Project Name: _____

DA Project No.: _____

I, _____, as duly authorized agent of _____ ("Bidder") as prospective bidder on the above named project ("Project") is requesting a copy of the project BID DOCUMENTS (bidding requirements, contract requirements, specifications, contract drawings, resource drawings if any, and addenda to date).

- A. Bidder is being provided copies of Bid Documents for the Project, which consists of two parts. One part of the Bid Documents is in the Hard Copy Format ("HCF") and the other part is in the Electronic Image Format ("EIF") on CD-ROM. Bidder acknowledges that HCF Documents and the EIF Documents are being provided as the official record set of documents issued for bidding. It is the Bidder's responsibility to review and obtain all information from both the HCF and the EIF documents necessary for a complete and accurate bid. This request is subject to the following conditions, which the Bidder hereby agrees to abide by:
- B. Bidder shall pay a non-refundable deposit for the Bid Documents in the amount of \$_____. In the event the Bidder is not the successful bidder, the bidder agrees to permanently dispose of the HCF and EIF on the Project CD-ROM.
- C. Bidder acknowledges that neither the EIF documents nor the CD-ROM will be updated by the Design Team. The CD-ROM contains the original documents and will not be updated regardless of when Bidder obtains the CD-ROM. Any changes to the contract documents will be issued as a separate document.
- D. Bidder is further warned that while the EIF information appears to be extremely accurate, this apparent accuracy is an artifact of the techniques used to generate it and is no way intended to imply actual accuracy. The Bidder acknowledges and takes full responsibility for the accuracy, correctness of measurements, areas, inventories derived, conclusions drawn, and information extracted from the EIF documents.
- E. Bidder understands and agrees the HCF and EIF documents are instruments of Architect's and Architect's Consultants' ("**Design Team**") professional service and are intended for one-time use by Bidder in the bidding of the Project. All HCF and EIF documents are and shall remain the property of the Design Team, who is deemed to be the author of the drawings and data, and the Design Team shall retain all common law, statutory law, and all other rights, including copyrights, with respect to Bidder.
- F. The Bidder shall indemnify and hold harmless, the Design Team, its officers, directors, employees or subcontractors, to the fullest extent permitted by law, against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees and defense costs arising out of or resulting from Bidder or any other person or entity that gains information from the Bid Documents or copies any part of the Bid Documents, or uses the Bid Documents or copies any part of the Bid Documents, for purposes other than the bidding of this project, and will be liable to the Design Team for fees equal to the fees paid by the client pursuant to developing the documents for this project.

DARDEN ARCHITECTS, INC.

Description of the HCF Documents and the EIF Documents on CD-ROM, provided:

**SUPPLEMENTARY
INSTRUCTIONS TO BIDDERS**

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Print Name (Bidder)

Title

Signature

Date:

3.3 BIDDER'S USAGE AGREEMENT FOR PARTIAL BID DOCUMENTS

Project Name: _____

DA Project No.: _____

I, _____, as duly authorized agent of _____ ("Bidder") as prospective bidder on the above named project ("Project"). The Bidder acknowledge having received at least one (1) complete set of the Bid Documents for the subject project and all Addenda issued to date in either Hard Copy Format ("HCF") and/or an Electronic Image Format ("EIF").

- A. The Bidder is requesting partial copies of the Bid Documents ("Partial Documents") in the format originally issued and that was prepared by the Architect and/or Architect's Consultants ("Design Team") on the subject Project, so that the information therein may be utilized in the Bidder's work on the same project. The Partial Documents are strictly intended for the Bidder's convenience and are not recognized as part of the official record set of Bid Documents issued for bidding. This request is subject to the following conditions, which the Bidder hereby agrees to abide by:
- B. The Bidder shall pay for all costs in reproducing the requested Partial Documents directly to the Printers. In the event that the Bidder is not the successful bidder, the Bidder agrees to permanently dispose of the Partial Documents.
- C. The Bidder recognizes that the value of the Partial Documents far exceeds the cost of printing. The Bidder further agrees that the Bidder will make no other copies of the Partial Documents. Any copying, and/or reuse of the Partial Documents without written authorization of Darden Architects, Inc. is prohibited.
- D. The Bidder understands that the accuracy of the information is an artifact of the techniques used to generate it and is in no way intended to imply actual accuracy. The Bidder agrees that by using these Partial Documents, the Bidder is in no way relieved of the responsibility to review and obtain all information from the complete set of the Bid Documents necessary for a complete and accurate bid.
- E. The Bidder understands and agrees to that any documents provided are instruments of the professional service by the Design Team and are intended for one-time use solely in the bidding of this Project. They shall remain the property of the Architect or the Architect's Consultants, who is deemed to be the author of the documents and who shall retain all common law, statutory law, and all other rights, including copyrights, with respect to the Bidder.
- F. The Bidder shall indemnify and hold harmless, the Design Team, its officers, directors, employees or subcontractors, to the fullest extent permitted by law, against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees and defense costs arising out of or resulting from Bidder or any other person or entity that gains information from the Partial Documents or copies the Partial Documents, or uses the Partial Documents or copies the Partial Documents, for purposes other than the bidding of this project, and will be liable to Design Team for fees equal to the fees paid by the client pursuant to developing the documents for this project.

**SUPPLEMENTARY
INSTRUCTIONS TO BIDDERS**

- G. In the event that the Bidder is a successful bidder, the Bidder agrees that all Bid Documents issued to the Bidder, and Partial Documents obtained by the Bidder, along with any other documents utilized by the Bidder in preparing the bid, will be included in the Escrow Bid Documents when required by the General Conditions. Any and all documents prepared and issued by the Design Team, which are included as part of the Escrow Bid Documents, will be returned to Darden Architects, Inc. at the close of escrow.

DARDEN ARCHITECTS, INC.

Description of the requested documents:

Print Name, (Bidder)

Title

Signature

Dated:

END OF SECTION

NOTICE TO CONTRACTORS

Notice is hereby given that **TULARE JOINT UNION HIGH SCHOOL DISTRICT** (hereinafter referred to as "Owner") will receive sealed lump sum bids prior to the date and time stated for the Bid Opening for the construction of:

MISSION OAK HIGH SCHOOL AQUATICS COMPLEX

as per drawings and specifications which may be obtained from the Architect

**DARDEN ARCHITECTS, INC.
6790 N. West Avenue
Fresno, California 93711
(559) 448-8051**

The Bid Documents are posted at Fresno Reprographics and can be viewed;
<https://www.fresnorepro.com/jobs/public>
The bidder can purchase downloads and hard copies from Fresno Reprographics

Time of completion for this project is to be within **Four Hundred and Fifty-Eight (458) calendar days** from the date established in the Owner's Notice to the Contractor to Proceed.

A **Non-Mandatory** Pre-Bid Bidder's Conference and walk-thru will be held on **August 8th at 3:30 p.m.** at MISSION OAK HIGH SCHOOL, located at 3442 E. Bardsley Ave, Tulare, California for the purpose of acquainting all prospective bidders with the bid documents and work site. Once the Pre-Bid Bidder's Conference is finished, the Pre-Bid walk-thru will occur.

Bids will be sealed and filed in the Business Office of the Owner

**TULARE JOINT UNION HIGH SCHOOL DISTRICT
426 N BLACKSTONE, TULARE, CA 93274**

before **2:00 p.m.** on **August 31, 2023.**

The *DVBE Declaration of Good Faith Efforts* to Use Disabled Veteran Business Enterprises must be signed and filed in the Business Office of the Owner before **2:00 p.m.** on **August 30, 2023**, at which time the bids (including the Declaration of Good Faith Efforts to Use Disabled Veteran Business Enterprises) will be opened in public.

Bids will be opened in public at the Business Office of the Owner

**TULARE JOINT UNION HIGH SCHOOL DISTRICT
426 N BLACKSTONE, TULARE, CA 93274**

Bids must be accompanied by a bidder's bond, cashier's check, or certified check for at least ten per cent (10%) of the amount of the base bid and made payable to the Owner, issued by an Admitted Surety (an insurance organization authorized by the Insurance Commissioner to transact business of insurance in the State of California during this calendar year), which shall be given as a guarantee that the bidder will enter into a contract if awarded the work and will be declared forfeited, paid to, or retained by the Owner as liquidated damages if the bidder refuses or neglects to enter into the contract provided by the Owner after being requested to do so.

The successful bidder will be required to furnish a Payment (Labor and Material) Bond in the amount of one hundred per cent (100%) of the contract price, and a Faithful Performance Bond in the amount of one hundred per cent (100%) of the contract price, said bonds to be secured from an Admitted Surety (an insurance organization authorized by the Insurance Commissioner to transact business of insurance in the State of California during this

calendar year), and satisfactory to the Owner. The bidder will be required to give satisfactory proof to the Owner of the maintenance of Public Liability and Property Damage Insurance in an amount with a combined single limit of not less than **\$1,200,000** per occurrence.

The successful bidder will be allowed to substitute securities or establish an escrow in lieu of retainage, pursuant to Public Contract Code Section 22300, and as described in the Agreement Form.

The Owner will not consider or accept any bids from contractors who are not licensed to do business in the State of California, in accordance with the California Public Contract Code, providing for the licensing of contractors. In accordance with Section 3300 of said Code, the Contractor shall have a Class **B** license.

The Director of the Department of Industrial Relations of the State of California, in the manner provided by law, has ascertained the general prevailing rate of per diem wages and rate for legal holidays and overtime work as set forth in Article IX of the Agreement. The Contractor must pay for any labor therein described or classified in an amount not less than the rates specified.

Contractors are required to register with the DIR after July 1, 2014, and pay a fee with the DIR to qualify to work on public works projects per SB 854. All contractors on public works projects over \$1,000.00 are required to submit Electronic Certified Payroll Records.

The Owner reserves the right to waive any irregularity and to reject any or all bids.

Unless otherwise required by law, no bidder may withdraw its bid for a period of sixty (60) days after date set for the opening thereof.

Dated: 7/27/2023

**TULARE JOINT UNION HIGH SCHOOL DISTRICT
VIVIAN HAMILTON**

Advertise: 8/3/2023

END OF SECTION

INSTRUCTIONS TO BIDDERS

SECURING DOCUMENTS:

Drawings and Specifications are available at:

DARDEN ARCHITECTS, INC.
6790 N. West Avenue
Fresno, California 93711
(559) 448-8051

BID DOCUMENTS:

The Bid Documents are posted at Fresno Reprographics and can be viewed;
<https://www.fresnorepro.com/jobs/public>
The bidder can purchase downloads and hard copies from Fresno Reprographics

PREQUALIFICATION:

This Contract is subject to prequalification. Pre-Qualification Applications may be submitted through the District's website. www.tjuhsd.org/Facilities. In Bids/RFPs/RFPs there is a category for Notice to Bidders. Please use the link for Quality Bidders Online Forms to apply. Quality Bidders is an online Pre-Qualification service for California school districts that allows contractors to submit an application to become a pre-qualified bidder for a district's formally bid projects. Submitted questionnaires and financial statements are not public records and shall not be open to the public.

PROPOSALS:

Proposals to receive consideration shall be made in accordance with the following instructions:

1. Proposals shall be made on a form, therefore, obtained from the Architect or Owner. Bids not made on the proper form shall be disregarded. All items on the Bid Proposal Form shall be filled out. Numbers must be stated in words and figures, and the signatures of all individuals must be in longhand. The completed form should be without interlineations, alterations, or erasures.
2. No proposal will be considered which makes exceptions, changes, or in any manner makes reservations to the terms of the drawings or specifications, except that explanations or alternate proposals may be made on a separate sheet attached to the bid form. They will not, however, be considered in determining low bid.
3. Questions regarding documents, discrepancies, omissions, or doubts as to meanings shall be referred immediately to the Architect who will send written instructions clarifying such questions to each bidder. Questions shall be referred immediately to the Construction Manager at chris@cmconstructionservices.com no later than August 22, 2023 at 2:00 PM. All responses will be by written addenda clarifying such questions. Oral responses will not be binding on the Owner or Architect or any Construction Manager.
4. Each bid must give the full business address of the bidder, and the name of each person signing shall also be typed or printed below the signature. Bids by individuals must be signed by the individual. Bids by partnerships must furnish the full names of all partners and must be signed in the partnership name by one of the partners, or by an authorized representative, followed by the signature and designation of the person signing. Bid by corporations must be signed with the legal name of the corporation, followed by the name of the state of incorporation and by the signature and designation of the president, secretary, or other person authorized to bind the corporation in the matter. Satisfactory evidence of the authority of the officer signing on behalf of a corporation shall be attached.
5. Pursuant to the provisions of Sections §4100 to §4114, inclusive, of the Public Contract Code of the State of California, which are hereby incorporated and made a part hereof, every bidder shall set forth in its bid:

INSTRUCTIONS TO BIDDERS

- A. The name and location of the place of business of each subcontractor who will perform work or labor or render service to the bidder in or about the construction of the work or improvement, or a subcontractor licensed by the state of California who, under subcontract to the bidder, specially fabricates and installs a portion of the work or improvement according to detailed drawings contained in the plans and specifications, in an amount in excess of one-half (1/2) of one percent (1 percent) of the bidder's total bid.
 - B. The portion of the work which will be done by each such subcontractor. If the bidder fails to specify a subcontractor for any portion of the work to be performed under the contract in excess of one-half (1/2) of one percent (1 percent) of the bidder's total bid, the bidder agrees to perform that portion itself. An inadvertent error in listing a California contractor's license number shall not be grounds for filing a bid protest or for considering the bid nonresponsive if the bidder submits the corrected contractor's license number to the Owner within 24 hours after the bid opening, or any continuation thereof, so long as the corrected contractor's license number corresponds to the submitted name and location for that subcontractor. The successful bidder shall not, without the consent of the Owner:
 - 1) Substitute any person as a subcontractor in place of the subcontractor designated in the original bid.
 - 2) Permit any subcontract to be assigned or transferred or allow it to be performed by anyone other than the original subcontractor listed in the bid.
 - 3) Sublet or subcontract any portion of the work in excess of one-half (1/2) of one percent (1 percent) of the total bid as to which the original bid did not designate a subcontractor.
6. A completed Non-collusion Declaration must accompany all proposals. Only one Non-collusion Declaration need be filed even if the bidder is bidding more than one possible project. The bidder must certify that the Bid is genuine and is not sham or collusive, or made in the interest of or on behalf of any bidder not named in the bid, and that the bidder has not directly or indirectly induced or solicited any other bidder to put in a sham bid, or any other possible bidder to refrain from bidding, and that the bidder has not in any manner sought by collusion to secure for itself an advantage over any other bidder.
 7. Proposals must be accompanied by a certified check, cashier's check, or bidder's bond, for an amount not less than ten percent (10 percent) of the amount of the base bid, made payable to the order of the Owner. If a bidder's bond accompanies the proposal, said bond shall be secured by an Admitted Surety (an insurance organization authorized by the Insurance Commissioner to transact business of insurance in the State of California during this calendar year) and satisfactory to the Owner. Said check or bond shall be given as a guarantee that the bidder will enter into the contract if awarded the work, and in case of refusal or failure to enter into said contract, the check or bond, as the case may be, shall be payable to the Owner and retained as liquidated damages. If the bid security exceeds ten percent (10 percent) of the actual contract awarded, because the bidder bid on more than one possible project, liquidated damages will be limited to ten percent (10 percent) of the actual contract awarded, and the remainder will be left uncashed or returned to the bidder.
 8. Proposals shall be sealed and filed as indicated in the Notice to Contractors. Note regarding facsimiles: EXCEPT FOR BID SECURITY, all submitted before the bid opening documents may be in the form of facsimiles which have been sent elsewhere and sealed before filing with the Owner. (Any bidder who uses or attempts to use the Owner's facsimile equipment will be disqualified immediately.) The originals of the faxed documents must be mailed to the Owner, postmarked the same as the bid opening, via certified mail, return receipt requested, or hand-delivered to the Owner by the close of business on the day of the bid opening.

EMPLOYMENT OF LABOR/PREVAILING WAGE RATES

The Director of Industrial Relations of the State of California, in the manner provided by law, has ascertained the general prevailing rate of per diem wages and the rate for legal holidays and overtime work. The Contractor must pay for any labor therein described or classified in an amount not less than the rates specified.

INSTRUCTIONS TO BIDDERS

Copies of the required wage rates can be determined at the State of California web site:
<https://www.dir.ca.gov/oprl/dprewagedetermination.htm>

Each contractor awarded a contract must have an agent of the firm to sign documents required by the California Labor Code and to receive proper state forms for the reporting of certified payroll.

Nothing contained herein shall be deemed to supersede any applicable laws, orders or regulations issued by competent authority governing wages, hours of work of the employment of labor, nor to condone any violation of such laws, orders or regulations.

The Contractor shall post at appropriate conspicuous weatherproof points on the site of the Project a schedule showing the Prevailing Wage Determinations published by the Director of the California Department of Industrial Relations that are applicable to the Project.

For apprenticeship or other training programs authorized by CALIFORNIA LABOR CODE SECTION §3093, and similar purposes, when the term per diem wages is used herein it shall have the meaning as defined in the Prevailing Wage Determinations as Published by the Director of the California Department of Industrial Relations and California Labor Code. Holiday and overtime work, when permitted by law, shall be paid for at the rate identified in the Prevailing Wage Determinations Issued by the Director of the California Department of Industrial Relations or at last one and one-half (1/2) times the specified basic rate of per diem wages, plus employer payments, unless otherwise specified in the contract documents or authorized by the CALIFORNIA CODE OF REGULATIONS SECTION §16200(a)(3)(F). Any worker employed to perform work on the Project, which work is not covered by any classification listed in the published general prevailing wage rate determinations of per diem wages determined by the Director of the California Department of Industrial Relations, shall be paid not less than the minimum rate of wages specified therein for the classification which most nearly corresponds to the work to be performed, and such minimum wage rate shall be retroactive to time of initial employment of such person in such classification. Each worker needed to execute the Work on the Project shall be paid travel and subsistence payments, as such travel and subsistence payments are defined in the prevailing wage determinations published by the Director of the California Department of Industrial Relations.

There shall be paid to each worker of the Contractor, or any Subcontractor, of any tier, 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. The Contractor and Subcontractors will be required to pay all workers on a weekly basis and to submit the certified payrolls to the California Department of Industrial Relations weekly.

The Contractor shall forfeit 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 California Department of Industrial Relations for such work or craft in which such worker is employed by the contractor or by any subcontractor, of any tier, in connection with the Work. Pursuant to CALIFORNIA LABOR CODE SECTION §1775, the difference between such prevailing wage rates and the amount paid to each worker for each calendar day, or portion thereof, for which each worker was paid less than the prevailing wage rate, shall be paid to each worker in the addition to the penalties.

CALIFORNIA LABOR CODE SECTION §1742.1 makes the Contractor, any Subcontractor and the payment bond insurer jointly and severally liable for Liquidated Damages equal to the total underpayment of wages remaining uncorrected for sixty (60) days after receipt of the first notice of the underpayment. The underpaid employee will receive both the Liquidated Damages and the underpayment amount. The District may also request imposition of penalties equal to Fifty Dollars (\$50.00) per day per worker in addition to the Liquidated Damages and underpayment.

After the District awards the public works contract, and before the commencement of work, a mandatory pre-job conference will be conducted. The pre-job conference will include the prime contractor and the subcontractors listed in its bid documents.

INSTRUCTIONS TO BIDDERS

Contractors shall maintain payrolls and basic records (e.g., time cards, canceled checks, cash receipts, trust fund forms, accounting ledgers, tax forms, etc.) during the course of the work and shall preserve them for a period of three (3) years for workers of all trades at the District's project sites. Such records shall contain the name, address, and social security number of each worker, his or her classification, the rate of pay (including the rates of contributions for, or costs assumed to provide, fringe benefits), daily and weekly number of hours worked, deductions made, and actual wages paid.

The Prime Contractor shall be responsible for ensuring that the labor standards provisions are followed by its subcontractors, and shall be responsible for the Labor Code violations of its subcontractors.

COMPLIANCE WITH EDUCATION CODE SECTION §45125.2

The Contractor shall be required to satisfy the conditions set forth in the Contract and EDUCATION CODE SECTION §45125.2 regarding fingerprinting requirements and student safety prior to permitting any contact with students. Upon award of the contract and before beginning work, the Contractor shall be required to provide a verification of compliance with the student safety provisions of the Contract and EDUCATION CODE SECTION §45125.2.

BIDDERS MUST COMPLETE, EXECUTE AND SUBMIT WITH THEIR BIDS THE DECLARATION OF GOOD FAITH EFFORTS TO USE DISABLED VETERAN BUSINESS ENTERPRISES (DVBE)

DVBE documents can be submitted within 24 hours of the bid.

WITHDRAWAL OF PROPOSALS:

Proposals may be withdrawn by the bidder prior to the time fixed for the submittal of bids. A successful bidder shall not be relieved of the bid unless by consent of the Owner or bidder's recourse to PUBLIC CONTRACT CODE SECTION §5100 et seq.

OPENING OF PROPOSALS:

Opening of proposals shall be as soon after the hour set as will be possible; opening and declaration to be as set forth in the Notice to Contractors. Any and all bidders will be permitted to attend. The Owner is allowed the number of days set forth in the Notice to Contractors in which to determine low bidder.

EXAMINATION OF CONTRACT DOCUMENTS AND SITE:

Before submitting a proposal, bidders shall examine the drawings, read the specifications, the form of contract, and other contract documents. They shall visit the site of the proposed work, examine the building, or buildings, if any, and any work that may have been done thereon. They shall fully inform themselves of all conditions, in, at, and about the site, the building or buildings, if any, and any work that may have been done thereon.

Pursuant to PUBLIC CONTRACT CODE SECTION §1104:

- (1) Bidders shall not be required to assume responsibility for the completeness and accuracy of architectural or engineering drawings and specifications, except on clearly designated design build projects;
- (2) However, bidders shall be required to review architectural or engineering drawings and specifications prior to submission of their bids and to report any errors and omissions to the Architect or the Owner; and
- (3) The review shall be confined to the bidder's capacity as a bidder and not as a licensed design professional.

INSTRUCTIONS TO BIDDERS

BID PROTEST

All bid protests must comply with the following, or they shall be rejected as invalid:

1. The protest shall be in writing;
2. The protest shall be filed and received no later than 4:00 p.m. on the fifth calendar day after the deadline for submittal of the bids;
3. The protest shall set forth in detail all grounds for the protest, including all facts, supporting documentation, legal authorities and arguments in support of the bid protest;
4. Before the bid protest deadline, the protesting party shall transmit the complete bid protest, including all documentation, to all other parties having a potential interest that may be adversely affected by the outcome of the protest, including but not limited to all other bidders who may have a reasonable prospect of losing or obtaining an award of the Contract depending on the outcome of the protest; and
5. All factual contentions must be supported by competent, admissible and credible evidence.

The procedures and time limits set forth in this section for bid protests are strictly construed and are bidder's sole and exclusive remedy in the event of a bid protest. Bidder's failure to strictly comply with these procedures and time limits shall constitute a waiver of any right to further pursue the bid protest, including but not limited to the presentation of a Government Code claim or legal proceedings. Any matter not set forth in the protest, including any ground for the protest or any evidence supporting a ground for the protest, shall be deemed waived.

A bidder may not rely on the bid protest submitted by another bidder, but must timely pursue its own bid protest.

Owner shall review a bid protest that was not rejected for failing to comply with the above procedures. Any final decision on Such a bid protest shall be made by the governing Board.

FORM OF CONTRACT:

The form of contract, which the successful bidder(s) will be required to execute, if awarded the work, is attached hereto and is made apart hereof.

ADDENDA (OR BULLETINS):

Any addenda (or bulletins), issued during the time of bidding, shall form a part of the drawings and specifications loaned to the bidder for the preparation of its proposal, shall be covered in the proposal, and shall be made a part of the Contract Documents.

- (1) Addenda (or bulletins), shall be stamped and signed by the A/E on Record and delegated Design Professional when applicable, and approved by DSA (Sec. 4-338(b), Part 1).
- (2) The deadline for Pre-Bid RFI's shall be submitted to the Construction Manager at chris@cmconstructionervices.com no later than August 22, 2023 at 2:00 PM. The Architect will include any needed items into an Addendum.

AWARD OF CONTRACT:

Rejection of any or all proposals, to contract work with whomever and in whatever manner, to abandon work entirely, and/or to waive any informality in receiving of bids is reserved as the right of the Owner. Before the contract or contracts are awarded, the Owner may at its sole discretion require from the proposed Contractor on each project further evidence of the reasonable qualifications of such contractor to faithfully, capably, and reasonably perform such proposed contract and may consider such evidence before making its decision on the award of such proposed contract(s).

The contract(s) shall be awarded to the lowest and most responsible bidder(s) as interpreted by the Owner and specified herein and shall be entered into by the successful bidder(s) within ten (10) days after being notified by the Owner. Identity of lowest bidder(s) will be determined as follows per the PUBLIC CONTRACT CODE SECTIONS §10780-§10785:

The lowest bid shall be the lowest total of the bid prices based on the sum of the following items.

- Base Bid
- Owners Contingency Fund

INSTRUCTIONS TO BIDDERS

- Alternate Bid - Snack Bar Building P2

The award, if made, will be made within sixty (60) days after the opening of proposals.

EXECUTION OF CONTRACT:

The Contract(s) shall be signed by the successful bidder(s) in as many originals as the Owner deems necessary and returned, together with the contract bonds and insurance certificates, within ten (10) days after the bidder has received notice that the contract for that project has been awarded.

CONTRACT BONDS:

Two bonds, as itemized below and in the forms presented in these contract documents, shall be furnished by the successful bidder on each project awarded at the time of entering into the contract and filed with the Owner. They shall be in the form of surety bonds issued by an Admitted Surety (an insurance organization authorized by the Insurance Commissioner to transact business of insurance in the State of California during this calendar year) and satisfactory to the Owner.

Performance Bond in the amount of one hundred percent (100 percent) of the contract sum to insure Owner during construction and for one year after completion against faulty or improper materials or workmanship and to assure Owner of full and prompt performance of the contract.

Payment Bond (Labor and Material) in the amount of one hundred percent (100 percent) of the contract sum in accordance with the laws of the State of California to secure payment of any and all claims for labor and materials used or consumed in performance of this contract.

DRAWINGS, SPECIFICATIONS AND ADDENDA OR BULLETINS:

Return by each bidder of all drawings, specifications and addenda or bulletins in an unmutated condition and without any marks or annotations is demanded within the time limit indicated under **DEPOSIT** in this section.

SUBSTITUTION OF MATERIALS:

All materials are mentioned as standards. Should a Contractor or Bidder (claimant) desire to substitute materials or methods for those specified, the Contractor or Bidder (claimant) shall follow the guidelines stated herein, and in accordance with Specification Section - SUBSTITUTION PROCEDURES and the PUBLIC CONTRACT CODE SECTION §3400. Each review of a substitution request by the Architect or its consultants will be billed to the Contractor or Bidder (claimant) at an hourly rate as indicated in Specification Section - SUBSTITUTION PROCEDURES.

Substitutions can be submitted in two ways: (1) Prior to Bid Opening, and (2) After Award of the Contract:

- (1) Prior to Bid Opening: The Contractor or Bidder (claimant) must insure that proposed substitutions of materials by the Contractor or Bidder (claimant) are submitted to the Architect's office up to fourteen (14) calendar days prior to the Bid Opening for review and possible approval of any equipment or materials thought to be equal to or better than those specified in the drawings or specifications. An Addendum will be issued at a minimum of seven (7) calendar days and a maximum of three (3) calendar days prior to Bid Opening including all equipment and materials deemed equivalent to those specified and approved by the Architect. Substitution submittals shall include comparative spec-data of that specified equipment or material and the proposed substitution as indicated on the completed "Substitution Request Form" in accordance with Specification Section - SUBSTITUTION PROCEDURES. Submittals without this information will be automatically rejected.
- (2) After Award of the Contract: In accordance with the provisions of Section §3400 of the California Public Contract Code, the Contractor awarded the Contract (claimant) will be provided a period of thirty-five (35) calendar days after the award of the Contract for submission of data substantiating a request for a substitution of "an equal" item or items. Substitution requests must be made as provided in the Contract Documents, and in accordance with Specification Section - SUBSTITUTION PROCEDURES. Submittals without this information will be automatically rejected.

INSTRUCTIONS TO BIDDERS

PAYMENTS:

Payments to the Contractor on account of the contract shall be made in accordance with the terms of the contract.

TAXES:

The Owner is exempt from payment of Federal Excise Tax on materials. The Owner will furnish exemption certificates to the Contractor to be used to obtain materials ordinarily subject to Federal Excise Tax without payment of the tax. Bidder shall deduct Federal Excise Taxes from their bid prices before submitting bids, so that such taxes will not be included in the Contract Sum.

TIME OF COMPLETION AND LIQUIDATED DAMAGES:

Time is of the essence in this contract, and the time of completion for this project shall be Four Hundred and fifty-eight (458) consecutive calendar days, all from the date established in the Owner's Notice to Proceed.

Should said work not be completed within the time limit as may be extended as herein provided, damages will be sustained by the Owner. It is understood and agreed that it is and will be impracticable or extremely difficult to determine the actual amount of damages which the Owner will sustain in the event of and by reason of such delay, and it is therefore agreed that the Contractor will pay the Owner the sum of Two Thousand Dollars (\$2,000.00) per consecutive calendar day for each and every day's delay beyond the time specified as and for liquidated damages; in case the Contractor fails to make such payment, the Owner may deduct the amount thereof from any money due or that may become due the Contractor under the contract. Should such money not be sufficient to cover the agreed liquidated damages, the Owner shall have the right to recover the balance from the Contractor or his sureties.

END OF SECTION

00 21 13.1 (AD1) - INSTRUCTIONS TO BIDDERS PRE-QUALIFICATIONS

Notice to Bidders

We appreciate your time and interest in wanting to be on our approved CUPCCAA and contractor list. The CUPCCAA application is accessible at all times and you can apply at any time. The Prequalified Contractor application will be accessible based on the needs (upcoming projects) of the district. Check periodically for updates and access to the Prequalified Contractor application. Please use the [Quality Bidders Online Forms](#) to apply.

Pre-Qualification

[California Assembly Bill \(AB\) 1565](#) went into effect on January 1, 2014. AB 1565 requires all general contractors and M/E/P subcontractors be prequalified, if the project is valued at \$1,000,000 or more and funded whole or in part with state facility bond funds, per the following public contract codes:

Public Contract Code 20111.5 enables districts to require prime contractors to be prequalified prior to accepting bids.

Public Contract Code 20111.6 requires the district to do so for certain projects. This applies to prime contractors and M/E/P sub-contractors with the following licenses:

- General contractors (A and B), mechanical, electrical, and plumbing subcontractors (C- 4, C-7, C-10, C-16, C-20, C-34, C-36, C-38, C-42, C-43, and C-46)
- The district must receive complete applications at least ten (10) business days prior to the scheduled bid opening on any advertised project in order for the candidate to qualify for a project in excess of \$1,000,000 and partially funded by the state. Pre-qualification approval will remain valid for one (1) calendar year from the date of notice of qualification except as noted in the [pre-qualification documents](#).

CUPCCA (informal bidding)

(a) Public projects of sixty thousand dollars (\$60,000) or less may be performed by the employees of a public agency by force account, by negotiated contract, or by purchase order. (b) Public projects of two hundred thousand dollars (\$200,000). If all bids received are in excess of two hundred thousand dollars (\$200,000), (c) the governing body of the public agency may, by adoption of a resolution by a four-fifths vote, award the contract, at two hundred twelve thousand five hundred dollars (\$212,500) or less, to the lowest responsible bidder, if it determines the cost estimate of the public agency was reasonable.

- Per [Public Contract Code 22032](#) and [Public Contract Code 22034](#)

Tulare Joint Union High School District has contracted with Colbi Technologies to provide a web-based process for submitting to their Prequalified Contractor and CUPCCAA lists called Quality Bidders. To get started, please fill out the [Quality Bidders online form](#).

- For detailed instructions in completing your application, please navigate to the bottom of the [Contractor Instructions page](#).

Please contact [Jason Bonds via email](#) with any questions or call (559) 688-2021. You may also [email Colbi Tech Support](#) with any questions about the use of the Quality Bidders web-based tool.

Thank you for your interest in working with Tulare Joint Union High School District.

- [Approved Contractor List](#)
- [CUPCCAA Contractor List](#)

BID FORM

_____, 2023

**TULARE JOINT UNION HIGH SCHOOL DISTRICT
426 N Blackstone,
Tulare, CA 93274**

Dear Board Members:

The undersigned doing business under the firm name of _____

hereby propose and agree to enter into an agreement, to furnish any and all labor, materials, equipment and services for the completion of work described hereinafter and in the contract documents entitled construction of:

MISSION OAK HIGH SCHOOL AQUATICS COMPLEX

prepared by:

**DARDEN ARCHITECTS, INC.
6790 N. West Avenue
Fresno, California 93711
(559) 448-8051**

The lowest bid shall be the lowest total of the bid prices based on the sum of the following items.

- Base Bid
- Owners Contingency Fund
- Alternate Bid - Snack Bar Building P2

for the sum quoted below:

BASE BID (as defined in Specification Section - SUMMARY OF WORK):

WRITTEN IN WORDS Dollars.

FIGURES\$ _____

OWNERS CONTINGENCY FUND:

WRITTEN IN WORDSFour Hundred Thousand Dollars.

FIGURES\$400,000

ITEMIZED BREAKDOWN OF ALTERNATES: The Bidder agrees that each of the following itemized amounts in each ALTERNATE BID will not be withdrawn for a period of ninety (90) calendar days after the Bid Opening date. Should the Owner elect to accomplish any one or combination of the following amounts not included as part of the Contract Price (and within the ninety (90) calendar day period), then the Bidder (Contractor of record) agrees to incorporate and complete the item as a prepared Change Order at the stipulated amounts.

**ADDITIVE ALTERNATE BIDThis item is to used for determining the lowest bid
SNACK BAR BUILDING P2**

WRITTEN IN WORDS _____ Dollars.

FIGURES \$ _____

If written notice of the acceptance of this bid is mailed, telegraphed, or delivered to the undersigned within sixty (60) days after the date of opening of the bids, or any time thereafter before this bid is withdrawn, the undersigned will, within ten (10) days after the date of such mailing, telegraphing, or delivering of such notice, execute and deliver a contract in the form of agreement present in these contract documents and give Performance and Payment Bonds in accordance with the specifications and bid as accepted.

The undersigned hereby designates as his office to which such notice of acceptance may be mailed, telegraphed, or delivered:

Our Public Liability and Property Damage Insurance is placed with _____

Our Workers' Compensation Insurance is placed with _____

Circular letters, bulletins, addenda, etc., bound with specifications or issued during the time of bidding are included in the proposal, and, in completing the contract, they are to become part thereof.

The receipt of the following addenda to the specifications is acknowledged:

Addendum No. ____ Date ____ Addendum No. ____ Date ____ Addendum No. ____ Date ____

Addendum No. ____ Date ____ Addendum No. ____ Date ____ Addendum No. ____ Date ____

Addendum No. ____ Date ____ Addendum No. ____ Date ____ Addendum No. ____ Date ____

This bid may be withdrawn at any time prior to the scheduled time for the opening of bids or any authorized postponement thereof.

Note: Each bid must give the full business address of the bidder and be signed by him with his usual signature. Bids by partnerships must furnish the full name of all partners and must be signed in the partnership name by

one of the members of the partnership, or by an authorized representative, followed by the signature and designation of the person signing. Bid by corporations must be signed with the legal name of the corporation, followed by the name of the state of incorporation and by the signature and designation of the president, secretary, or other person authorized to bind it in the matter. The name of each person signing shall also be typed or printed below the signature. When requested by the Owner, satisfactory evidence of the authority of the officer signing in behalf of the corporation shall be furnished.

Dated _____, 20____

Signed _____

Print or Type Name _____

Business Address _____

Phone Number: _____

FAX Number: _____

Contractor's

License Number _____

Additional Signature Lines if Applicable:

Signed _____

Print or Type Name _____

Business Address _____

Signed _____

Print or Type Name _____

Business Address _____

Signed _____

Print or Type Name _____

Business Address _____

State of Incorporation if Applicable _____

“ Evidence of authority to bind corporation is attached.

END OF SECTION

Bid Bond

KNOW ALL MEN BY THESE PRESENTS that we the undersigned _____ as Principal and _____ as Surety, are hereby held and firmly bound unto the Tulare Joint Union High School District, "Owner" in the sum of _____ Dollars (\$_____) for payment of which sum, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

The condition of the above obligation is such that whereas the Principal has submitted to the Owner a certain bid, attached hereto and hereby made a part hereof, to enter into a Contract in writing for the construction of the Mission Oak Aquatics Complex Project in strict accordance with Contract Documents.

NOW, THEREFORE,

- a. If said bid shall be rejected, or, in the alternative;
- b. If said bid shall be accepted and the Principal shall execute and deliver a contract in the form of agreement attached hereto and shall execute and deliver Performance and Payment Bonds in the forms attached hereto (all properly completed in accordance with said bid), and shall in all other respects perform the agreement created by the acceptance of said bid;

Then this obligation shall be void, otherwise the same shall remain in full force and effect, it being expressly understood and agreed that the liability of the Surety for any and all default of the Principal hereunder shall be the amount of this obligation as herein stated.

Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract on the call for bids, or to the Work to be performed hereunder, or the specifications accompanying the same, shall in any way affect its obligation 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 or the call for bids, or to the Work, or to the specifications.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under several seals this ____ day of _____, the name and corporate party being hereto affixed and these presents duly signed by its

undersigned representative, pursuant to authority of its governing body. In the presence of:

(Notary Seal)

(Principal)

(Business Address)

(Corporate Surety)

Business Address)

By: _____

The rate or premium of this bond is _____ per thousand, the total amount of premium charged, \$ _____

(The above must be filled in by Corporate Surety).

DESIGNATION OF SUBCONTRACTORS

Each bidder shall set forth below the name and the location of the place of business of each subcontractor and the California contractor license number, and public works contractor registration number (for all projects over Twenty-five Thousand Dollars (\$25,000)), of each subcontractor who will perform work or labor or render service to the Contractor in or about the construction of the Work or improvement, or to a subcontractor licensed by the State of California who, under subcontract to the Contractor, specially fabricates and installs a portion of the Work or improvement according to detailed drawings contained in the plans and specifications, in an amount in excess of one-half of 1 percent (0.5%) of the bidder's total bid, and the portion of the Work which will be done by each subcontractor. An inadvertent error in listing a California contractor's license number shall not be grounds for filing a bid protest or for considering the bid nonresponsive if the bidder submits the corrected contractor's license number to the Owner within 24 hours after the bid opening, or any continuation thereof, so long as the corrected contractor's license number corresponds to the submitted name and location for that subcontractor. If the Contractor fails to specify a subcontractor for any portion of the Work to be performed under the Contract in excess of one-half of 1 percent (0.5%) of the Contractor's total bid, the Contractor shall be deemed to have agreed to perform such portion itself, and shall not be permitted to subcontract that portion of the Work except under the conditions hereinafter set forth.

Subletting or subcontracting of any portion of the Work as to which no subcontractor was designated in the original bid shall only be permitted in cases of public emergency or necessity, and then only after a finding reduced to writing as a public record of the legislative body of the Owner.

For all projects over Twenty-five Thousand Dollars (\$25,000): for any bid proposal submitted and for any contract for public work entered into, an inadvertent error in listing a subcontractor who is not registered under Labor Code section 1725.5 shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive, provided that either: the subcontractor is registered prior to the bid opening; or the subcontractor is registered and has paid the penalty registration fee specified in Labor Code section 1725.5(a)(2)(E), if applicable, within 24 hours after the bid opening; or the subcontractor is replaced by another registered subcontractor under Public Contract Code section 4107. Failure of a listed subcontractor to be registered shall be grounds under Public Contract Code section 4107 for the Contractor, with the Owner's consent, to substitute a registered subcontractor for the unregistered subcontractor.

Failure to provide this information in a legible manner may result in the rejection of an otherwise acceptable bid.

NOTE: *Reproduce page two of this section for additional listings needed beyond the length of this form.*

Portion of Work	Name of Subcontractor & Phone No.	Location of Subcontractor	California Contractor License Number	Public Works Contractor Registration Number (if applicable)

I am the authorized representative of the Bidder submitting this Designation of Subcontractors and I declare that each subcontractor listed holds a valid and current contractor license in good standing in California to perform the portion of work for which the subcontractor is listed.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on _____, 20____, at _____[city], _____[state].

Signature: _____

Print Name: _____

Title: _____

PRIME BIDDER GOOD FAITH EFFORT WORKSHEET

This worksheet is to be used to assist the Prime Bidder in meeting the 3% DVBE participation goal

BIDDER'S NAME	BUSINESS ADDRESS	CONTACT PERSON
TELEPHONE NUMBER	OWNER	COUNTY

GENERAL INSTRUCTIONS:

This worksheet is to be used to assist you in meeting the 3 percent DVBE participation goal. If specific information is not provided for Parts I through III, you do not meet the test of the "Good Faith Effort" and cannot so certify. If you are qualifying based on a "Good Faith Effort" you must include this form with your bid/proposal to the Owner.

PART I – CONTACTS

To identify DVBE subcontractors/suppliers for participation in your bid/proposal, contact must be made with each of the following categories. It is recommended that you contact several DVBE organizations.

CATEGORY	TELEPHONE NUMBER	DATE CONTACTED	PERSON CONTACTED
1. Owner			
2. Office of Small Business and Disabled Veteran Business Enterprise Services (OSDS). OSDS provides assistance locating DVBEs at https://caleprocure.ca.gov/pages/PublicSearch/supplier-search.aspx .	(916) 375-4940		
3. DVBE Organizations (<i>List</i>):			
4. Write "recorded message" in this column, if applicable.			

PART II – ADVERTISEMENTS *You must make at least two (2) advertisements, one (1) in a paper that focuses on DVBE and one (1) in a trade paper. Advertisements should be published at least 14 days prior to bid/proposal opening; if you cannot advertise 14 days prior, advertise as soon as possible and provide an explanation. (Advertisements must be published in time to allow for a reasonable response). Advertisements must include that your firm is seeking DVBE participation, the project name and location, your firm’s name, your firm’s contact person, and phone number.*

Attach copies of advertisements to this form.

FOCUS/TRADE PAPER NAME	CHECK ONE		DATE OF ADVERTISEMENT
	TRADE	FOCUS	

PART III – DVBE SOLICITATIONS *List DVBE subcontractors/suppliers that were invited to bid. Use the following instructions to complete the remainder of this section (read the three columns as a sentence from left to right). If you need additional space to list DVBE solicitations, please use a separate page and attach to this form.*

IF THE DVBE.....	THEN.....	AND.....
Was selected to participate	Check "yes" in the "SELECTED" column, include the applicable dollar amount in Part III of the Prime Bidder Certification	Include a copy of their DVBE letter from OSDs.
Was not selected to participate	Check "no" in the "SELECTED" column	State why in the "REASON NOT SELECTED" column.
Did not respond to your solicitation	Check the "NO RESPONSE" column	

DISABLED VETERANS BUSINESS ENTERPRISES CONTACTED	SELECTED		REASON NOT SELECTED <i>This section must be completed</i>	NO RESPONSE
	YES	NO		

IMPORTANT NOTE:

Please be aware that certification of the "Good Faith Effort" may only be made if you fully complete Parts I, II, and III on both sides of this form. A copy of this form must be retained by you and may be subject to a future audit.

CERTIFICATION

I, _____ certify that I am the bidder's Chief Executive Officer and that I have made a diligent effort to ascertain the facts with regard to the representations made herein. In making this certification, I am aware of Section 12650 et seq. of the Government Code providing for the imposition of treble damages for making false claims.

SIGNATURE OF CHIEF EXECUTIVE OFFICER	DATE
--------------------------------------	------

NONCOLLUSION DECLARATION
TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

Owner: Tulare Joint Union High School District

Contract for: Mission Oak Aquatic Complex Project

The undersigned declares:

I am the _____ of _____, the party making the foregoing bid.

The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or to refrain from bidding. The bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder. All statements contained in the bid are true. The bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on _____, 20___, at _____ [city], _____ [state].

Signature

Print Name

AGREEMENT BETWEEN OWNER AND CONTRACTOR

This Agreement, effective _____, 2023, is by and between Tulare Joint Union High School District, Tulare County, California, hereinafter called the "Owner" and _____ hereinafter called the "Contractor."

WITNESSETH: That the Contractor and the Owner for the consideration hereinafter named agree as follows:

ARTICLE I. SCOPE OF WORK. The Contractor agrees to furnish all labor, equipment and materials, including tools, implements, and appliances required, and to perform all the Work in a good and workmanlike manner, free from any and all liens and claims from mechanics, material suppliers, subcontractors, artisans, machinists, teamsters, freight carriers, and laborers required for:

**MISSION OAK AQUATIC COMPLEX
3442 E. Bardsley Ave
Tulare, CA. 93274**

all in strict compliance with the plans, drawings and specifications therefore prepared by:

**DARDEN ARCHITECTS
6790 N. West Ave, Fresno CA.93711
(559) 448-8051**

and other Contract Documents relating thereto.

ARTICLE II. CONTRACT DOCUMENTS. The Contractor and the Owner agree that all of the documents listed in Article 1.1.1 of the General Conditions form the Contract Documents which form the Contract.

ARTICLE III. TIME TO COMPLETE AND LIQUIDATED DAMAGES.

Time is of the essence in this Contract, and the time of Completion for the Work ("the Contract Time") shall be Four Hundred and fifty-eight (458) calendar days from (a) the date of commencement of the Work as established in the Owner's Notice to Proceed.

Failure to Complete the Work within the time and in the manner provided for by the Contract Documents shall subject the Contractor to liquidated damages. The actual occurrence of damages and the actual amount of the damages which the Owner would suffer if the Work were not Completed within the Contract Time are dependent upon many circumstances and conditions which could prevail in various combinations and, from the nature of the case, it is impracticable and extremely difficult to fix the actual

damages. Damages which the Owner would suffer in the event of such delay include, but are not limited to, loss of the use of the Work, disruption of activities, costs of administration and supervision, and the incalculable inconvenience and loss suffered by the public.

Accordingly, the parties agree that the amount herein set forth shall be the amount of damages which the Owner shall directly incur upon failure of the Contractor to Complete the Work within the Contract Time: \$1,000 for each calendar day by which Completion of the Work is delayed beyond the Contract Time as adjusted by Change Orders.

If Contractor causes delay to any other contractor's work on the Project that results in delayed *completion* of the Project, Contractor shall be subject to liquidated damages in the amount set forth above for each calendar day Contractor delayed *completion* of the Project. The actual occurrence of damages and the actual amount of the damages which the Owner would suffer for such delayed *completion* of the Project are dependent upon many circumstances and conditions which could prevail in various combinations and, from the nature of the case, it is impracticable and extremely difficult to fix the actual damages. Damages which the Owner would suffer in the event of such delay include, but are not limited to, loss of the use of the other contractor's work and the Project, disruption of activities, costs of administration and supervision, and the incalculable inconvenience and loss suffered by the public.

Accordingly, the parties agree that the amount set forth herein shall be presumed to be the amount of damages which the Owner shall directly incur for each calendar day that *completion* of the Project is delayed because of Contractor caused delays to the work of other contractors.

For Contractor's obligations regarding claims against Owner from other contractors on the Project alleging that Contractor caused delays to their work, see General Conditions sections 3.7.4, 3.16 and 6.2.3.

If liquidated damages accrue as described above, the Owner, in addition to all other remedies provided by law, shall have the right to assess the liquidated damages at any time, and to withhold liquidated damages (and any interest thereon) at any time from any and all retention or progress payments, which would otherwise be or become due the Contractor. In addition, if it is reasonably apparent to the Owner before liquidated damages begin to accrue that Contractor cannot or will not Complete the Work within the Contract Time, Owner may assess and withhold, from retention or progress payments, the estimated amount of liquidated damages that will accrue in the future. If the retained percentage or withheld progress payments are not sufficient to discharge all liabilities of the Contractor incurred under this Article, the Contractor and its sureties shall continue to remain liable to the Owner until all such liabilities are satisfied in full.

If Owner accepts any work or makes any payment under this Agreement after a default by reason of delays, the payment or payments shall in no respect constitute a waiver or

modification of any Agreement provisions regarding time of Completion and liquidated damages.

ARTICLE IV. PAYMENT AND RETENTION. The Owner agrees to pay the Contractor in current funds _____ Dollars (\$_____) for work satisfactorily performed after receipt of properly documented and submitted Applications for Payment and to make payments on account thereof, as provided in the General Conditions.

ARTICLE V. CHANGES. Changes in this Agreement or in the Work to be done under this Agreement shall be made as provided in the General Conditions.

ARTICLE VI. TERMINATION. The Owner or Contractor may terminate the Contract as provided in the General Conditions.

ARTICLE VII. PREVAILING WAGES. The Project is a public work, the Work shall be performed as a public work and pursuant to the provisions of Section 1770 et seq. of the Labor Code of the State of California, which are hereby incorporated by reference and made a part hereof, the Director of Industrial Relations has determined the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work in the locality in which the Work is to be performed, for each craft, classification or type of worker needed to execute this Contract. Per diem wages shall be deemed to include employer payments for health and welfare, pension, vacation, apprenticeship or other training programs, and similar purposes. Copies of the rates are on file at the Owner's principal office. The rate of prevailing wage for any craft, classification or type of workmanship to be employed on this Project is the rate established by the applicable collective bargaining agreement which rate so provided is hereby adopted by reference and shall be effective for the life of this Agreement or until the Director of the Department of Industrial Relations determines that another rate be adopted. It shall be mandatory upon the Contractor and on any subcontractor to pay not less than the said specified rates to all workers employed in the execution of this Agreement.

The Contractor and any subcontractor under the Contractor as a penalty to the Owner shall forfeit not more than Two Hundred Dollars (\$200.00) for each calendar day or portion thereof for each worker paid less than the stipulated prevailing rates for such work or craft in which such worker is employed. The difference between such stipulated prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the stipulated prevailing wage rate shall be paid to each worker by the Contractor.

The Contractor and each Subcontractor shall keep or cause to be kept an accurate record for Work on this Contract and Project showing the names, addresses, social security numbers, work classification, straight time and overtime hours worked and occupations of all laborers, workers and mechanics employed by them in connection with the performance of this Contract or any subcontract thereunder, and showing also the

actual per diem wage paid to each of such workers, which records shall be open at all reasonable hours to inspection by the Owner, its officers and agents and to the representatives of the Division of Labor Standards Enforcement of the State Department of Industrial Relations. The Contractor and each subcontractor shall furnish a certified copy of all payroll records directly to the Labor Commissioner.

Public works projects shall be subject to compliance monitoring and enforcement by the Department of Industrial Relations. For all projects over Twenty-five Thousand Dollars (\$25,000), a contractor or subcontractor shall not be qualified to submit a bid or to be listed in a bid proposal subject to the requirements of Public Contract Code section 4104 unless currently registered and qualified under Labor Code section 1725.5 to perform public work as defined by Division 2, Part 7, Chapter 1 (§§ 1720 et seq.) of the Labor Code. For all projects over Twenty-five Thousand Dollars (\$25,000), a contractor or subcontractor shall not be qualified to enter into, or engage in the performance of, any contract of public work (as defined by Division 2, Part 7, Chapter 1 (§§ 1720 et seq.) of the Labor Code) unless currently registered and qualified under Labor Code section 1725.5 to perform public work.

ARTICLE VIII. WORKING HOURS. In accordance with the provisions of Sections 1810 to 1815, inclusive, of the Labor Code of the State of California, which are hereby incorporated and made a part hereof, the time of service of any worker employed by the Contractor or a Subcontractor doing or contracting to do any part of the Work contemplated by this Agreement is limited and restricted to eight hours during any one calendar day and forty hours during any one calendar week, provided, that work may be performed by such employee in excess of said eight hours per day or forty hours per week provided that compensation for all hours worked in excess of eight hours per day, and forty hours per week, is paid at a rate not less than one and one-half (1½) times the basic rate of pay. The Contractor and every Subcontractor shall keep an accurate record showing the name of and the actual hours worked each calendar day and each calendar week by each worker employed by them in connection with the Work. The records shall be kept open at all reasonable hours to inspection by representatives of the Owner and the Division of Labor Standards Enforcement. The Contractor shall as a penalty to the Owner forfeit Twenty-five Dollars (\$25.00) for each worker employed in the execution of this Agreement by the Contractor or by any subcontractor for each calendar day during which such worker is required or permitted to work more than eight hours in any one calendar day, and forty hours in any one calendar week, except as herein provided.

ARTICLE IX. APPRENTICES. The Contractor agrees to comply with Chapter 1, Part 7, Division 2, Sections 1777.5 and 1777.6 of the California Labor Code, which are hereby incorporated and made a part hereof. These sections require that contractors and subcontractors employ apprentices in apprenticeable occupations in a ratio of not less than one hour of apprentice's work for each five hours of work performed by a journeyman (unless an exemption is granted in accordance with Section 1777.5) and that contractors and subcontractors shall not discriminate among otherwise qualified employees as indentured apprentices on any public works solely on the ground of sex, race, religious creed, national origin, ancestry or color. Only apprentices as defined in

Labor Code Section 3077, who are in training under apprenticeship standards and who have signed written apprentice agreements, will be employed on public works in apprenticeable occupations. The responsibility for compliance with these provisions is fixed with the Contractor for all apprenticeable occupations.

ARTICLE X. DSA OVERSIGHT PROCESS. The Contractor must comply with the applicable requirements of the Division of State Architect (“DSA”) Construction Oversight Process (“DSA Oversight Process”), including but not limited to (a) notifying the Owner’s Inspector of Record/Project Inspector (“IOR”) upon commencement and completion of each aspect of the Work as required under DSA Form 156; (b) coordinating the Work with the IOR’s inspection duties and requirements; (c) submitting verified reports under DSA Form 6-C; and (d) coordinating with the Owner, Owner’s Architect, any Construction Manager, any laboratories, and the IOR to meet the DSA Oversight Process requirements without delay or added costs to the Work or Project.

Contractor shall be responsible for any additional DSA fees related to review of proposed changes to the DSA-approved construction documents, to the extent the proposed changes were caused by Contractor’s wrongful act or omissions. If inspected Work is found to be in non-compliance with the DSA-approved construction documents or the DSA-approved testing and inspection program, then it must be removed and corrected. Any construction that covers unapproved or uninspected Work is subject to removal and correction, at Contractor’s expense, in order to permit inspection and approval of the covered work in accordance with the DSA Oversight Process.

ARTICLE XI. INDEMNIFICATION AND INSURANCE. The Contractor will defend, indemnify and hold harmless the Owner, its governing board, officers, agents, trustees, employees and others as provided in the General Conditions.

By this statement the Contractor represents that it has secured the payment of Workers' Compensation in compliance with the provisions of the Labor Code of the State of California and during the performance of the work contemplated herein will continue so to comply with said provisions of said Code. The Contractor shall supply the Owner with certificates of insurance evidencing that Workers' Compensation Insurance is in effect and providing that the Owner will receive thirty (30) days' notice of cancellation.

Contractor shall provide the insurance set forth in the General Conditions. The amount of general liability insurance shall be \$2,000,000 per occurrence for bodily injury, personal injury and property damage and the amount of automobile liability insurance shall be \$1,000,000 per accident for bodily injury and property damage combined single limit.

ARTICLE XII. ENTIRE AGREEMENT. The Contract constitutes the entire agreement between the parties relating to the Work, and supersedes any prior or contemporaneous agreement between the parties, oral or written, including the Owner's award of the Contract to Contractor, unless such agreement is expressly incorporated herein. The Owner makes no representations or warranties, express or implied, not

specified in the Contract. The Contract is intended as the complete and exclusive statement of the parties' agreement pursuant to Code of Civil Procedure section 1856.

ARTICLE XIII. EXECUTION OF OTHER DOCUMENTS. The parties to this Agreement shall cooperate fully in the execution of any and all other documents and in the completion of any additional actions that may be necessary or appropriate to give full force and effect to the terms and intent of the Contract.

ARTICLE XIV. EXECUTION IN COUNTERPARTS. This Agreement may be executed in counterparts such that the signatures may appear on separate signature pages. A copy, or an original, with all signatures appended together, shall be deemed a fully executed Agreement.

ARTICLE XV. BINDING EFFECT. Contractor, by execution of this Agreement, acknowledges that Contractor has read this Agreement and the other Contract Documents, understands them, and agrees to be bound by their terms and conditions. The Contract shall inure to the benefit of and shall be binding upon the Contractor and the Owner and their respective successors and assigns.

ARTICLE XVI. SEVERABILITY; GOVERNING LAW; CHOICE OF FORUM. If any provision of the Contract shall be held invalid or unenforceable by a court of competent jurisdiction, such holding shall not invalidate or render unenforceable any other provision hereof. The Contract shall be governed by the laws of the State of California. Any action or proceeding seeking any relief under or with respect to this Agreement shall be brought solely in the Superior Court of the State of California for the County of Tulare, subject to transfer of venue under applicable State law, provided that nothing in this Agreement shall constitute a waiver of immunity to suit by Owner.

ARTICLE XVII. AMENDMENTS. The terms of the Contract shall not be waived, altered, modified, supplemented or amended in any manner whatsoever except by written agreement, including change orders, signed by the parties and approved or ratified by the Governing Board.

ARTICLE XVIII. ASSIGNMENT OF CONTRACT. The Contractor shall not assign or transfer by operation of law or otherwise any or all of its rights, burdens, duties or obligations without the prior written consent of the surety on the payment bond, the surety on the performance bond and the Owner.

ARTICLE XIX. WRITTEN NOTICE. Written notice shall be deemed to have been duly served if delivered in person to the individual or member of the firm or to an officer of the corporation for whom it was intended, or if delivered at or sent by registered or certified or overnight mail to the last business address known to the person who gives the notice.

(CONTRACTOR)

(OWNER)

SIGNED BY (Contractor)

(Title)

CALIFORNIA CONTRACTOR'S
LICENSE NO.

LICENSE EXPIRATION DATE

NOTE: Contractor must give the full business address of the Contractor and sign with Contractor's usual signature. Partnerships must furnish the full name of all partners and the Agreement must be signed in the partnership name by a general partner with authority to bind the partnership in such matters, followed by the signature and designation of the person signing. The name of the person signing shall also be typed or printed below the signature. Corporations must sign with the legal name of the corporation, followed by the name of the state of incorporation and by the signature and designation of the chairman of the board, president or any vice president, and then followed by a second signature by the secretary, assistant secretary, the chief financial officer or assistant treasurer. All persons signing must be authorized to bind the corporation in the matter. The name of each person signing shall also be typed or printed below the signature. Satisfactory evidence of the authority of the officer signing on behalf of a corporation shall be furnished.

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PAYMENT BOND
(Labor and Material)

KNOW ALL MEN BY THESE PRESENTS:

That WHEREAS, Tulare Joint Union High School District (the "Owner" of the public works project described below) and _____, hereinafter designated as the "Principal," have entered into a Contract for the furnishing of all materials and labor, services and transportation, necessary, convenient, and proper to construct:

Mission Oak Aquatic Complex Project
3442 E. Bardsley Ave
Tulare, CA. 93274

Which said agreement dated _____, _____, and all of the Contract Documents are hereby referred to and made a part hereof;

and

WHEREAS, the Principal is required, before entering upon the performance of the work, to file a good and sufficient bond with the body by whom the Contract is awarded to secure the claims arising under said agreement.

NOW, THEREFORE, THESE PRESENTS WITNESSETH:

That the said Principal and the undersigned _____ ("Surety") are held and firmly bound unto all laborers, material men, and other persons, and bound for all amounts due, referred to in Civil Code section 9554, subdivision (b), in the sum of _____ Dollars (\$ _____) which sum well and truly be made, we bind ourselves, our heirs, executors, administrators, successors, or assigns, jointly and severally, by these presents.

The condition of this obligation is that if the said Principal or any of its subcontractors, or the heirs, executors, administrators, successors, or assigns of any, all, or either of them, shall fail to pay any of the persons named in Civil Code section 9100, or any of the amounts due, as specified in Civil Code section 9554, subdivision (b), that said Surety will pay the same in an amount not exceeding the amount hereinabove set forth, and also in case suit is brought upon this bond, will pay costs and reasonable attorney's fees to be awarded and fixed by the Court, and to be taxed as costs and to be included in the judgment therein rendered.

It is hereby expressly stipulated and agreed that this bond shall inure to the benefit of any and all persons, companies, and corporations entitled to file claims so as to give a right of action to them or their assigns in any suit brought upon this bond.

Should the condition of this bond be fully performed, then this obligation shall become null and void, otherwise it shall be and remain in full force and effect.

And the said Surety, for value received, thereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of said contract or the specifications accompanying the same shall in any manner affect its obligations on this bond, and it does hereby waive notice of any such change, extension, alteration, or addition.

IN WITNESS WHEREOF, this instrument has been duly executed by the Principal and Surety this _____ day of _____, _____.

(To be signed by _____)
(Principal and Surety, _____)
(and acknowledged and _____)
(Notarial Seal attached _____)

Principal

Surety

By: _____
Attorney-in-Fact

The above bond is accepted and approved this ____ day of _____.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS that we, _____ as Principal and _____ as Surety, are held and firmly bound unto Tulare Joint Union High School District, in the County of Tulare, State of California, hereinafter called the "Owner", in the sum of _____ Dollars (\$ _____) for the payment of which sum well and truly made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, to the Owner for the full performance of a certain contract with the Owner, the terms of which are incorporated herein by reference, dated _____, 20 ____, for construction of:

**Mission Oak Aquatic Complex Project
3442 E. Bardsley Ave
Tulare, CA. 93274**

The condition of this obligation is such that, if the Principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of said Contract during the original term of said Contract and any extensions thereof that may be granted by the Owner, with or without notice to the Surety, and for the period of time specified in the Contract after completion for correction of faulty or improper materials and workmanship and during the life of any guaranty or warranty required under the Contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreement of any and all duly authorized modifications of said Contract that may hereafter be made, then this obligation is to be void, otherwise to remain in full force and virtue.

And the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the Work to be performed thereunder or the specifications accompanying the same, shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract, or to the Work, or to the specifications.

No further agreement between Surety and Owner shall be required as a prerequisite to the Surety performing its obligations under this bond.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals this _____ day of _____, _____ hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

(To be signed by _____)
(Principal and Surety, _____)
(and acknowledged and _____)
(Notarial Seal attached _____)

(Affix Corporate Seal)

(Individual Principal)

(Business Address)

(Affix Corporate Seal)

(Corporate Principal)

(Business Address)

(Affix Corporate Seal)

(Corporate Surety)

(Business Address)

By: _____

The rate of premium on this bond is _____ per thousand.

The total amount of premium charged is _____.

The above must be filled in by Corporate Surety.

DRUG-FREE WORKPLACE CERTIFICATION

This Drug-Free Workplace Certification is required pursuant to Government Code Sections 8350 *et seq.*, the Drug-Free Workplace Act of 1990. The Drug-Free Workplace Act of 1990 requires that every person or organization awarded a contract or grant for the procurement of any property or services from any State agency must certify that it will provide a drug-free workplace by doing certain specified acts. In addition, the Act provides that each contract awarded by a State agency may be subject to suspension of payments or termination of the contract, or both, and the contractor may be subject to debarment from future contracting if the state agency determines that specified acts have occurred.

Pursuant to Government Code Section 8355, every person or organization awarded a contract or grant from a State agency shall certify that it will provide a drug-free workplace 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 the person's or organization's workplace and specifying actions which will be taken against employees for violations 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) The person's or organization's policy of maintaining a drug-free workplace;
 - (3) The availability of drug counseling, rehabilitation and employee-assistance programs;
 - (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 or grant be given a copy of the statement required by subdivision (a) and that, as a condition of employment on the contract or grant, the employee agrees to abide by the terms of the statement.

I, the undersigned, agree to fulfill the terms and requirements of Government Code Section 8355 listed above and will publish a statement notifying employees concerning (a) the prohibition of controlled substance at the workplace, (b) establishing a drug-free awareness program, and (c) requiring that each employee engaged in the performance of the contract or grant be given a copy of the statement required by Section 8355(a) and requiring that the employee agree to abide by the terms of that statement.

I also understand that if the Owner determines that I have either (a) made a false certification herein, or (b) violated this certification by failing to carry out the requirements of Section 8355, that the contract or grant awarded herein is subject to suspension of payments, termination, or both. I further understand that should I violate the terms of the Drug-Free Workplace Act of 1990, I may be subject to debarment in accordance with the requirements of Section 8350 *et seq.*

I acknowledge that I am aware of the provisions of Government Code Section 8350 *et seq.* and hereby certify that I will adhere to the requirements of the Drug-Free Workplace Act of 1990.

Name of Contractor

Signature

Print Name

Date

FINGERPRINTING NOTICE AND ACKNOWLEDGMENT
(Education Code Section 45125.2(a))

Note: This document must be executed and submitted with the bid.

Business entities entering into contracts with the Owner for the construction, reconstruction, rehabilitation or repair of a facility must comply with Education Code sections 45125.1 and 45125.2. Such entities are responsible for ensuring full compliance with the law and should therefore review all applicable statutes and regulations. The following information is provided simply to assist such entities with compliance with the law.

1. If the Owner determines your employee(s) or you as a sole proprietorship will have more than limited contact with students, then you must take one or more of the following steps:
 - a. Install a physical barrier at the worksite to limit contact with pupils.
 - b. Have an employee (if not a sole proprietorship), who the Department of Justice has ascertained has not been convicted of a violent or serious felony, continually monitor and supervise employees. The entity shall verify in the Independent Contractor Student Contact Form to the Owner that the employee charged with monitoring and supervising its employees has no such convictions. (See attached.)
 - c. Arrange, with Owner's approval, for surveillance by Owner's personnel.

If one or more of these steps is taken, you are not required to comply with Education Code section 45125.1.

2. If you are providing the services in an emergency or exceptional situation, you are not required to comply with Education Code section 45125.2. An "emergency or exceptional" situation is one in which pupil health or safety is endangered or when repairs are needed to make a facility safe and habitable. Owner shall determine whether an emergency or exceptional situation exists.

I have read the foregoing and agree to comply with the requirements of Education Code §§ 45125.1 and 45125.2 as applicable.

Dated: _____

Signature

Name: _____

Title: _____

ATTACHMENT

Under Education Code section 45125.1, no employee of a contractor or subcontractor, and no sole proprietor, who has been convicted of or has criminal proceedings pending for a violent or serious felony may come into contact with any student. A violent felony is any felony listed in subdivision (c) of Section 667.5 of the Penal Code. Those felonies are presently defined as:

- (1) Murder or voluntary manslaughter.
- (2) Mayhem.
- (3) Rape as defined in paragraph (2) or (6) of subdivision (a) of Section 261 or paragraph (1) or (4) of subdivision (a) of Section 262.
- (4) Sodomy as defined in subdivision (c) or (d) of Section 286.
- (5) Oral copulation as defined in subdivision (c) or (d) of Section 288a.
- (6) Lewd or lascivious act as defined in subdivision (a) or (b) of Section 288.
- (7) Any felony punishable by death or imprisonment in the state prison for life.
- (8) Any felony in which the defendant inflicts great bodily injury on any person other than an accomplice which has been charged and proved as provided for in Section 12022.7, 12022.8, or 12022.9 on or after July 1, 1977, or as specified prior to July 1, 1977, in Sections 213, 264, and 461, or any felony in which the defendant uses a firearm which use has been charged and proved as provided in subdivision (a) of Section 12022.3, or Section 12022.5 or 12022.55.
- (9) Any robbery.
- (10) Arson, in violation of subdivision (a) or (b) of Section 451.
- (11) Sexual penetration as defined in subdivision (a) or (j) of Section 289.
- (12) Attempted murder.
- (13) A violation of Section 18745, 18750, or 18755.
- (14) Kidnapping.
- (15) Assault with the intent to commit a specified felony, in violation of Section 220.
- (16) Continuous sexual abuse of a child, in violation of Section 288.5.
- (17) Carjacking, as defined in subdivision (a) of Section 215.
- (18) Rape, spousal rape, or sexual penetration, in concert, in violation of Section 264.1.

- (19) Extortion, as defined in Section 518, which would constitute a felony violation of Section 186.22 of the Penal Code.
- (20) Threats to victims or witnesses, as defined in Section 136.1, which would constitute a felony violation of Section 186.22 of the Penal Code.
- (21) Any burglary of the first degree, as defined in subdivision (a) of Section 460, wherein it is charged and proved that another person, other than an accomplice, was present in the residence during the commission of the burglary.
- (22) Any violation of Section 12022.53.
- (23) A violation of subdivision (b) or (c) of Section 11418.

A serious felony is any felony listed in subdivision (c) Section 1192.7 of the Penal Code. Those felonies are presently defined as:

- (1) Murder or voluntary manslaughter; (2) Mayhem; (3) Rape; (4) Sodomy by force, violence, duress, menace, threat of great bodily injury, or fear of immediate and unlawful bodily injury on the victim or another person; (5) Oral copulation by force, violence, duress, menace, threat of great bodily injury, or fear of immediate and unlawful bodily injury on the victim or another person; (6) Lewd or lascivious act on a child under the age of 14 years; (7) Any felony punishable by death or imprisonment in the state prison for life; (8) Any felony in which the defendant personally inflicts great bodily injury on any person, other than an accomplice, or any felony in which the defendant personally uses a firearm; (9) Attempted murder; (10) Assault with intent to commit rape, or robbery; (11) Assault with a deadly weapon or instrument on a peace officer; (12) Assault by a life prisoner on a non-inmate; (13) Assault with a deadly weapon by an inmate; (14) Arson; (15) Exploding a destructive device or any explosive with intent to injure; (16) Exploding a destructive device or any explosive causing bodily injury, great bodily injury, or mayhem; (17) Exploding a destructive device or any explosive with intent to murder; (18) Any burglary of the first degree; (19) Robbery or bank robbery; (20) Kidnapping; (21) Holding of a hostage by a person confined in a state prison; (22) Attempt to commit a felony punishable by death or imprisonment in the state prison for life; (23) Any felony in which the defendant personally used a dangerous or deadly weapon; (24) Selling, furnishing, administering, giving, or offering to sell, furnish, administer, or give to a minor any heroin, cocaine, phencyclidine (PCP), or any methamphetamine-related drug, as described in paragraph (2) of subdivision (d) of Section 11055 of the Health and Safety Code, or any of the precursors of methamphetamines, as described in subparagraph (A) of paragraph (1) of subdivision (f) of Section 11055 or subdivision (a) of Section 11100 of the Health and Safety Code; (25) Any violation of subdivision (a) of Section 289 where the act is accomplished against the victim's will by force, violence, duress, menace, or fear of immediate and

unlawful bodily injury on the victim or another person; (26) Grand theft involving a firearm; (27) carjacking; (28) any felony offense, which would also constitute a felony violation of Section 186.22; (29) assault with the intent to commit mayhem, rape, sodomy, or oral copulation, in violation of Section 220; (30) throwing acid or flammable substances, in violation of Section 244; (31) assault with a deadly weapon, firearm, machine gun, assault weapon, or semiautomatic firearm or assault on a peace officer or firefighter, in violation of Section 245; (32) assault with a deadly weapon against a public transit employee, custodial officer, or school employee, in violation of Sections 245.2, 245.3, or 245.5; (33) discharge of a firearm at an inhabited dwelling, vehicle, or aircraft, in violation of Section 246; (34) commission of rape or sexual penetration in concert with another person, in violation of Section 264.1; (35) continuous sexual abuse of a child, in violation of Section 288.5; (36) shooting from a vehicle, in violation of subdivision (c) or (d) of Section 26100; (37) intimidation of victims or witnesses, in violation of Section 136.1; (38) criminal threats, in violation of Section 422; (39) any attempt to commit a crime listed in this subdivision other than an assault; (40) any violation of Section 12022.53; (41) a violation of subdivision (b) or (c) of Section 11418; and (42) any conspiracy to commit an offense described in this subdivision.

INDEPENDENT CONTRACTOR STUDENT CONTACT FORM

Contractor Name: _____
Supervisor/Foreman Name: _____
Start Date: _____
Completion Date: _____
Location of Work: _____
Hours of Work: _____
Length of Time on Grounds: _____
Number of Employees on the Job: _____

Yes No
[] [] Employees or sole proprietor will have more than limited contact with students as determined by Owner, or if by Contractor, please explain:

If yes, the following steps will be taken to ensure student safety (check):

- A physical barrier will be installed at the worksite to limit contact with pupils.
- Employees (if not a sole proprietorship) will be continually monitored and supervised by an employee who has not been convicted of a violent or serious felony.

Name of Supervising Employee:

Date of Department of Justice verification that supervising employee has not been convicted of a violent or serious felony:

Name of employee who is the custodian of the Department of Justice verification information:

- Owner agrees: Employees or sole proprietor will be surveilled by Owner’s personnel.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Dated: _____
Signature _____
Typed Name: _____
Title: _____

Note: This document must be executed and submitted with the executed Agreement between Owner and Contractor.

IRAN CONTRACTING ACT CERTIFICATION
(Public Contract Code sections 2202-2208)
(To be Executed by Bidder and Submitted With Bid)

As required by Public Contract Code (“PCC”) section 2204 for contracts of \$1,000,000 or more, please insert bidder’s or financial institution’s name and Federal ID Number (if available) and complete **one** of the options below. Please note that California law establishes penalties for providing false certifications, including civil penalties equal to the greater of \$250,000 or twice the amount of the contract for which the false certification was made; contract termination; and three-year ineligibility to bid on contracts. (PCC §2205.)

OPTION #1 - CERTIFICATION

I, the official named below, certify I am duly authorized to execute this certification on behalf of the bidder/financial institution identified below, and the bidder/financial institution identified below is **not** on the current list of persons engaged in investment activities in Iran created by California Department of General Services (“DGS”) and is not a financial institution extending twenty million dollars (\$20,000,000) or more in credit to another person/bidder, for 45 days or more, if that other person/bidder will use the credit to provide goods or services in the energy sector in Iran and is identified on the current list of persons engaged in investment activities in Iran created by DGS. (PCC §2204(a).)

<i>Bidder Name/Financial Institution (Printed)</i>		<i>Federal ID Number (or n/a)</i>
<i>By (Authorized Signature)</i>		
<i>Printed Name and Title of Person Signing</i>		
<i>Date Executed</i>	<i>Executed in</i>	

OPTION #2 – EXEMPTION

Pursuant to Public Contract Code sections 2203(c) and (d), a public entity may permit a bidder/financial institution engaged in investment activities in Iran, on a case-by-case basis, to be eligible for, or to bid on, submit a proposal for, or enters into or renews, a contract for goods and services. If you have obtained an exemption from the certification requirement under the Iran Contracting Act, please fill out the information below, and attach documentation demonstrating the exemption approval.

<i>Bidder Name/Financial Institution (Printed)</i>		<i>Federal ID Number (or n/a)</i>
<i>By (Authorized Signature)</i>		
<i>Printed Name and Title of Person Signing</i>		<i>Date Executed</i>

ROOF PROJECT CERTIFICATION

(Public Contract Code §3006(a) and (b))

I, _____ [name], _____ [name of employer], certify that I have not offered, given, or agreed to give, received, accepted, or agreed to accept, any gift, contribution, or any financial incentive whatsoever to or from any person in connection with the roof project contract. As used in this certification, "person" means any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals. Furthermore, I, _____ [name], _____ [name of employer], certify that I do not have, and throughout the duration of the contract, I will not have, any financial relationship in connection with the performance of this contract with any architect, engineer, roofing, consultant, materials manufacturer, distributor, or vendor that is not disclosed below.

I, _____ [name], _____ [name of employer], have the following financial relationships, with an architect, engineer, roofing consultant, materials manufacturer, distributor, or vendor, or other person in connection with the following roof project contract:

[name and address of building, contract date and number]

[name and address of building, contract date and number]

[name and address of building, contract date and number]

[name and address of building, contract date and number]

I certify that to the best of my knowledge, the contents of this disclosure are true, or are believed to be true.

_____ Signature _____ Date

_____ Print Name

_____ Print Name of Employer

This is a fiduciary account created by statute, Public Contract Code section 22300. The funds deposited in this account shall not be released to Contractor or any other person or entity, other than Owner, including pursuant to any purported lien or writ of attachment or execution, without the prior written, express approval of Owner.

ESCROW AGREEMENT FOR SECURITY DEPOSITS IN LIEU OF RETENTION

This Escrow Agreement is made and entered into by and between the Tulare Joint Union High School District, whose address is 426 N. Blackstone Ave. Tulare, CA 93274 (hereinafter called "Owner"), _____ whose address is _____ (hereinafter called "Contractor"); and _____, a state or federally chartered bank in California whose address is _____ (hereinafter called "Escrow Agent").

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

1. Pursuant to section 22300 of the Public Contract Code of the State of California, Contractor has the option to deposit securities with Escrow Agent as a substitute for retention earnings required to be withheld by the Owner pursuant to the Contract entered into between the Owner and Contractor in the amount of _____ Dollars (\$ _____), and dated _____, _____, (the "Contract"). Alternatively, on written request of the Contractor, the Owner shall make payments of the retention earnings directly to the Escrow Agent. When Contractor deposits the securities as a substitute for retention earnings, the Escrow Agent shall notify the Owner within ten (10) calendar days of the deposit. The market value of the securities at the time of the substitution, as valued by the Owner, shall be at least equal to the cash amount then required to be withheld as retention under the terms of the Contract between the Owner and Contractor. If the Owner determines that the securities are not adequate it will notify Contractor and Escrow Agent, and Contractor shall deposit additional security as further determined by the Owner. Securities shall be held in the name of the Owner and shall designate the Contractor as the beneficial owner.
2. Thereafter, Owner shall make progress payments to the Contractor for such funds which otherwise would be withheld from progress payments pursuant to the Contract provisions, provided that the Escrow Agent holds securities in the form and amount specified above.
3. Pursuant to Public Contract Code section 22300, as an alternative to the procedures set forth above, Contractor may request in writing that the Owner pay retention amounts directly to Escrow Agent. When the Owner makes payment of

retentions earned directly to the Escrow Agent, the Escrow Agent shall hold them for benefit of the Contractor until such time as the escrow created under this Escrow Agreement is terminated. The Contractor may direct the investment of the payments into securities. All terms and conditions of this Escrow Agreement and the rights and responsibilities of the parties shall be equally applicable and binding when the Owner pays the Escrow Agent directly.

4. The Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account and all expenses of the Owner. These expenses and payment terms shall be determined by the Owner, Contractor and Escrow Agent.
5. The interest earned on the securities or the money market accounts held in escrow and all interest earned on that interest shall be for the sole account of Contractor and shall be subject to withdrawal by Contractor at any time and from time to time without notice to the Owner.
6. Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account only by written notice to Escrow Agent accompanied by written authorization from Owner to the Escrow Agent that Owner consents to the withdrawal of the amount sought to be withdrawn by Contractor.
7. The Owner shall have the right to draw upon the securities or any amount paid directly to Escrow Agent in the event of default by the Contractor. Upon seven (7) days written notice to the Escrow Agent from the Owner of the default, the Escrow Agent shall immediately convert the securities to cash and shall distribute the cash, including any amounts paid directly to Escrow Agent pursuant to Section 3 above, as instructed by Owner. Escrow Agent shall not be concerned with the validity of any notice of default given by Owner pursuant to this paragraph, and shall promptly comply with Owner's instructions to pay over said escrowed assets. Escrow Agent further agrees to not interplead the escrowed assets in response to a conflicting demand and hereby waives any present or future opportunity of interpleader.
8. Upon receipt of written notification from the Owner certifying that the Contract is final and complete, and that the Contractor has complied with all requirements and procedures applicable to the Contract, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees and charges of the Escrow Account. The escrow shall be closed immediately upon disbursement of all moneys and securities on deposit and payment of fees and charges.
9. Escrow Agent shall rely on the written notifications from the Owner and Contractor pursuant to Sections (4), (5), (6), (7) and (8) of this Agreement and the Owner and Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of the securities and interest as set forth above.

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

ON BEHALF OF OWNER:

Signature

Typewritten Name

Title

ON BEHALF OF CONTRACTOR:

Signature

Typewritten Name

Title

ON BEHALF OF ESCROW AGENT:

Signature

Typewritten Name

Title

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

OWNER:

Signature

Typewritten Name

Title

CONTRACTOR:

Signature

Typewritten Name

Title

ESCROW AGENT:

Signature

Typewritten Name

Title

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

Sufficient Funds Declaration
(Labor Code section 2810)
To Be Executed by Bidder and Submitted with Bid

Owner: Tulare Joint Union High School District

Contract for: Mission Oak Aquatic Complex Project

I, _____, declare that I am the _____ of _____, the entity making and submitting the bid for the above Project that accompanies this Declaration, and that such bid includes sufficient funds to permit _____ [insert name of entity] to comply with all local, state or federal labor laws or regulations during the performance of the Contract for the Project, including payment of prevailing wage, and that _____ [the entity] will comply with the provisions of Labor Code section 2810(d) if awarded the Contract.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and executed on _____ 20__, at _____ [city], _____ [state].

Date: _____

Signature
Print Name: _____
Print Title: _____

WORKERS' COMPENSATION CERTIFICATE

Labor Code Section 3700, in relevant part, 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 as one employer in a group of employers. Said certificate 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, ... "

I am aware of the provisions of the Labor Code Section 3700 which 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 the work of this contract. I shall supply the Owner with certificates of insurance evidencing that Workers' Compensation Insurance is in effect and providing that the Owner will receive thirty (30) days' notice of cancellation.

Name of Contractor

Signature

Print Name

Date

(In accordance with Article 5 (commencing at Section 1860), Chapter 1, Part 7, Division 2 of the Labor Code, the above certificate must be signed and filed with the awarding body prior to performing any work under the contract.)

GENERAL CONDITIONS

for

CONTRACT OF CONSTRUCTION

FOR MISSION OAK AQUATIC COMPLEX PROJECT

TULARE JOINT UNION HIGH SCHOOL DISTRICT

JULY 10, 2023

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ARTICLE 1

GENERAL CONDITIONS

1.1 BASIC DEFINITIONS

1.1.1 THE CONTRACT DOCUMENTS

The “Contract Documents” consist of the Agreement between Owner and Contractor (hereinafter the Agreement), Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, addenda issued prior to bid, Instructions to Bidders, Notice to Bidders, the Bid Form, Payment Bond, Performance Bond, required insurance certificates, additional insured endorsement and declarations page, Designation of Subcontractors, Noncollusion Declaration, Roof Project Certification (where applicable), Sufficient Funds Declaration (Labor Code section 2810) and the Fingerprinting Notice and Acknowledgment and Independent Contractor Student Contact Form, other documents referred to in the Agreement, and Modifications issued after execution of the Agreement. A Modification is a written amendment to the Contract signed by both parties, a Change Order, a Construction Change Directive, or a written order for a minor change in the Work issued by the Owner. The Contract Documents are complementary, and each obligation of the Contractor, Subcontractors, material or equipment suppliers in any one shall be binding as if specified in all.

1.1.2 THE CONTRACT

The Contract Documents form the Contract. The “Contract” represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a written Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind between the Architect and Contractor, any Construction Manager and Contractor, between the Owner and any Subcontractor or Sub-subcontractor, or between any persons or entities other than the Owner and the Contractor. The terms of the Contract shall not be waived, altered, modified, supplemented or amended in any manner whatsoever except by written agreement signed by the parties and approved or ratified by the Governing Board.

1.1.3 THE WORK

The “Work” shall include all labor, materials, services and equipment necessary for the Contractor to fulfill all of its obligations pursuant to the Contract Documents, including but not limited to punch list items and submission of documents. It shall include the initial obligation of any Contractor or Subcontractor, who performs any portion of the Work, to visit the Site of the proposed Work with Owner’s representatives, a continuing obligation after the commencement of the Work to fully acquaint and familiarize itself with the conditions as they exist and the character of the operations to be carried on under the Contract Documents, and make such investigation as it may see fit so that it shall fully understand the facilities, physical conditions, and restrictions attending the Work under the Contract Documents. Each such Contractor or Subcontractor shall also thoroughly examine and become familiar with the Drawings,

Specifications, and associated bid documents. The “Site” refers to the grounds of the Project as defined in the Contract Documents and such adjacent lands as may be directly affected by the performance of the Work. The Work shall constitute a “work of improvement” under Civil Code section 8050 and Public Contract Code section 7107.

1.1.4 THE PROJECT

The “Project” is the total construction of the Work performed in accordance with the Contract Documents. However, where applicable, the Project may also include construction by the Owner or by separate contractors.

1.1.5 THE DRAWINGS

The “Drawings” are graphic and pictorial portions of the Contract Documents prepared for the Project and approved changes thereto, wherever located and whenever issued, showing the design, location, and scope of the Work, generally including plans, elevations, sections, details, schedules, and diagrams as drawn or approved by the Architect.

1.1.6 THE SPECIFICATIONS

The “Specifications” are that portion of the Contract Documents consisting of the written requirements for material, equipment, construction systems, instructions, quality assurance standards, workmanship, and performance of related services.

1.1.7 THE PROJECT MANUAL

The “Project Manual” is the volume usually assembled for the Work which may include, without limitation, the bidding requirements, sample forms, Agreement, Conditions of the Contract, and Specifications.

1.1.8 OR

“Or” shall include “and/or.”

1.1.9 COMPLETION

Statutory definitions of “Completion” and “Complete” shall apply for those statutory purposes. For all other purposes, including accrual of liquidated damages, Claims and warranties, “Completion” and “Complete” mean the point in the Work where (1) Contractor has fully and correctly performed all Work in all parts and requirements, including corrective and punch list work, and (2) Owner’s representatives have conducted a final inspection that confirmed this performance. Substantial, or any other form of partial or non-compliant, performance shall not constitute “Completion” or “Complete” under the Contract Documents, except to the extent that substantial completion is required for a milestone deadline.

1.1.10 COMPLETION OF THE PROJECT

For purposes of accrual of liquidated damages for delays to the Project, *completion* shall mean the point in the Project where (1) all contractors and Owner have fully and correctly performed all work of the entire Project in all parts and requirements, including corrective and punch list work, and (2) Owner's representatives have conducted a final inspection of the entire Project that confirmed this performance. Substantial, or any other form of partial or non-compliant, performance of the entire Project shall not constitute *completion* or *complete*.

1.2 EXECUTION, CORRELATION AND INTENT

1.2.1 CORRELATION AND INTENT

1.2.1.1 ***Documents Complementary and Inclusive.*** The Contract Documents are complementary and are intended to include all items required for the proper execution and Completion of the Work. Any item of work mentioned in the Specifications and not shown on the Drawings, or shown on the Drawings and not mentioned in the Specifications, shall be provided by Contractor as if shown or mentioned in both.

1.2.1.2 ***Coverage of the Drawings and Specifications.*** The Drawings and Specifications generally describe the work to be performed by Contractor. Generally, the Specifications describe work which cannot be readily indicated on the Drawings and indicate types, qualities, and methods of installation of the various materials and equipment required for the Work. It is not intended to mention every item of Work in the Specifications, which can be adequately shown on the Drawings, or to show on the Drawings all items of Work described or required by the Specifications even if they are of such nature that they could have been shown. All materials or labor for Work, which is shown on the Drawings or the Specifications (or is reasonably inferable therefrom as being necessary to Complete the Work), shall be provided by the Contractor whether or not the Work is expressly covered in the Drawings or the Specifications. It is intended that the Work be of sound, quality construction, and the Contractor shall be responsible for the inclusion of adequate amounts to cover installation of all items indicated, described, or implied in the portion of the Work to be performed by Contractor.

1.2.1.3 ***Conflicts.*** Without limiting Contractor's obligation to identify conflicts for resolution by the Owner, it is intended that the more stringent, higher quality, and greater quantity of Work shall apply.

1.2.1.4 ***Conformance With Laws.*** Each and every provision of law required by law to be inserted in this Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon application of either party the Contract shall be amended in writing to make such insertion or correction.

Before commencing any portion of the Work, Contractor shall check and review the Drawings and Specifications for such portion for conformance and compliance with all laws, ordinances, codes, rules and regulations of all governmental authorities and public utilities

affecting the construction and operation of the physical plant of the Project, all quasi-governmental and other regulations affecting the construction and operation of the physical plant of the Project, and other special requirements, if any, designated in the Contract Documents. In the event Contractor observes any violation of any law, ordinance, code, rule or regulation, or inconsistency with any such restrictions or special requirements of the Contract Documents, Contractor shall promptly notify Architect and Owner in writing of same and shall ensure that any such violation or inconsistency shall be corrected in the manner provided hereunder prior to the construction of that portion of the Work. Where requirements of the Contract Documents exceed those of the applicable building codes and ordinances, the Contract Documents shall govern. Contractor shall comply with all applicable Federal, State and local laws.

If, as and to the extent that Public Contract Code section 1104 is deemed to apply after the award of the Contract, Contractor shall not be required to assume responsibility for the completeness and accuracy of architectural or engineering plans and specifications, notwithstanding any other provision in the Contract Documents, except to the extent that Contractor discovered or should have discovered and reported any errors and omissions to the Architect and Owner, including but not limited to as the result of any review of the plans and specifications by Contractor required by the Instructions to Bidders or other Contract Documents, whether or not actually performed by Contractor.

1.2.1.5 **Ambiguity.** Before commencing any portion of the Work, Contractor shall carefully examine all Drawings and Specifications and other information given to Contractor as to materials and methods of construction and other Project requirements. Contractor shall immediately notify Architect and Owner in writing of any perceived or alleged error, inconsistency, ambiguity, or lack of detail or explanation in the Drawings and Specifications in the manner provided herein. If the Contractor or its Subcontractors, material or equipment suppliers, or any of their officers, agents, and employees performs, permits, or causes the performance of any Work under the Contract Documents, which it knows or should have known to be in error, inconsistent, or ambiguous, or not sufficiently detailed or explained, Contractor shall bear any and all costs arising therefrom including, without limitation, the cost of correction thereof without increase or adjustment to the Contract Sum or the time for performance. If Contractor performs, permits, or causes the performance of any Work under the Contract Documents prepared by or on behalf of Contractor which is in error, inconsistent or ambiguous, or not sufficiently detailed or explained, Contractor shall bear any and all resulting costs, including, without limitation, the cost of correction, without increase to or adjustment in the Contract Sum or the time for performance. In no case shall any Subcontractor proceed with the Work if uncertain without the Contractor's written direction and/or approval.

1.2.1.6 **Execution.** Execution of the Agreement Between Owner and Contractor by the Contractor is a representation that the Contractor has visited the Site, become familiar with the local conditions under which the Work is to be performed and has correlated personal observations with the requirements of the Contract Documents.

1.2.2 ADDENDA AND DEFERRED APPROVALS

1.2.2.1 **Addenda.** Subsequent addenda issued shall govern over prior addenda only to the extent specified. In accordance with Title 24, California Code of Regulations, addenda shall be approved by the Division of the State Architect (“DSA”).

1.2.2.2 **Deferred Approvals.** The requirements approved by the DSA on any item submitted as a deferred approval in accordance with Title 24, California Code of Regulations, shall take precedence over any previously issued addenda, drawing or specification.

1.2.3 SPECIFICATION INTERPRETATION

1.2.3.1 **Titles.** The Specifications are separated into titled sections for convenience only and not to dictate or determine the trade or craft involved. Organization of the Specifications into divisions, sections and articles, and 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.

1.2.3.2 **As Shown, Etc.** Where “as shown,” “as indicated,” “as detailed,” or words of similar import are used, reference is made to the Drawings accompanying the Specifications unless otherwise stated. Where “as directed,” “as required,” “as permitted,” “as authorized,” “as accepted,” “as selected,” or words of similar import are used, the direction, requirement, permission, authorization, approval, acceptance, or selection by Architect is intended unless otherwise stated.

1.2.3.3 **Provide.** “Provide” means “provided complete in place,” that is, furnished, installed, tested, and ready for operation and use.

1.2.3.4 **General Conditions.** The General Conditions and any supplementary general conditions are a part of each and every section of the Specifications.

1.2.3.5 **Abbreviations.** In the interest of brevity, the Specifications are written in an abbreviated form and may not include complete sentences. Omission of words or phrases such as “Contractor shall,” “shall be,” etc., are intentional. Nevertheless, the requirements of the Specifications are mandatory. Omitted words or phrases shall be supplied by inference in the same manner as they are when a “note” occurs on the Drawings.

1.2.3.6 **Plural.** Words in the singular shall include the plural whenever applicable or the context so indicates.

1.2.3.7 **Metric.** The Specifications may indicate metric units of measurement as a supplement to U.S. customary units. When indicated thus: 1” (25 mm), the U. S. customary unit is specific, and the metric unit is nonspecific. When not shown with parentheses, the unit is specific. The metric units correspond to the “International System of Units” (SI) and generally follow ASTM E 380, “Standard for Metric Practice.”

1.2.3.8 **Standard Specifications.** Any reference to standard specifications of any society, institute, association, or governmental authority is a reference to the organization's standard specifications, which are in effect as of the date the Notice to Bidders is first published. If applicable specifications are revised prior to completion of any part of the Work, the Contractor may, if acceptable to Owner and Architect, perform such Work in accordance with the revised specifications. The standard specifications, except as modified in the Specifications for the Project, shall have full force and effect as though printed in the Specifications. Architect will furnish, upon request, information as to how copies of the standard specifications referred to may be obtained.

1.2.3.9 **Absence of Modifiers.** In the interest of brevity, the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

1.3 **OWNERSHIP AND USE OF ARCHITECT'S DRAWINGS, SPECIFICATIONS AND OTHER DOCUMENTS**

The Drawings, Specifications, and other documents prepared on behalf of the Owner are instruments of the services of the Architect and its consultants and are the property of the Owner. The Contractor may retain one contract record set. Neither the Contractor nor any Subcontractor, Sub-subcontractor, or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications, and other documents prepared by the Architect, and unless otherwise indicated the Architect shall be deemed the author of them. All copies of them, except the Contractor's record set, shall be returned or suitably accounted for to the Owner, upon request upon Completion of the Work. The Drawings, Specifications, and other documents prepared by the Architect, and copies thereof furnished to the Contractor, are for use solely with respect to this Contract. They are not to be used by the Contractor or any Subcontractor, Sub-subcontractor, or material or equipment supplier on other contracts or projects or for additions to this Contract or Project outside the scope of the Work without the specific written consent of the Owner and the Architect. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers are granted a limited license to use and reproduce applicable portions of the Drawings, Specifications, and other documents prepared by the Architect appropriate to and for use in the execution of their Work under the Contract Documents. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Owner's property interest or other reserved right. All copies made under this license shall bear appropriate attribution and the statutory copyright notice, if any, shown on the Drawings, Specifications and other documents prepared by the Architect.

ARTICLE 2

OWNER

2.1 DEFINITION

The term “Owner” means the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term “Owner” means the Owner and/or the Owner’s authorized representatives, including but not limited to architects and construction managers. To the extent the Contract Documents indicate that Owner has assigned duties to particular representatives of the Owner (such as the Architect, or any construction manager), Owner reserves the right at all times to reassign such duties to different Owner representatives.

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

2.2.1 INTENTIONALLY LEFT BLANK

2.2.2 SITE SURVEY

When required by the scope of the Project, the Owner will furnish, at its expense, a legal description or a land survey of the Site, giving, as applicable, grades and lines of streets, alleys, pavements, adjoining property, rights-of-way, restrictions, easements, encroachments, zoning, deed restrictions, boundaries, and contours of the Site. Surveys to determine locations of construction, grading, and Site work shall be provided by the Contractor.

2.2.3 SOILS

2.2.3.1 *Owner Furnished Services.* When required by the scope of the Project, the Owner will furnish, at its expense, the services of geotechnical engineers or consultants when reasonably required or as required by local or state codes. Such services with reports and appropriate professional recommendations shall include test boring, test pits, soil bearing values, percolation tests, air and water pollution tests, and ground corrosion and resistivity tests, including necessary operations for determining subsoil, air, and water conditions.

2.2.3.2 *Contractor Reliance.* Test borings and soils reports for the Project have been made for the Owner to indicate the subsurface materials that might be encountered at particular locations on the Project. The Owner has made these documents available to the Contractor and the Contractor has studied the results of such test borings and information that it has as to the subsurface conditions and Site geology as set forth in the test borings and soils reports. The Owner does not assume any responsibility whatsoever with respect to the sufficiency or accuracy of the borings made, or of the logs of the test borings, or of other investigations, or of the soils reports furnished pursuant hereto, or of the interpretations to be made beyond the location or depth of the borings. There is no warranty or guarantee, either express or implied that the conditions indicated by such investigations, borings, logs, soil reports or other information are representative of those existing throughout the Site of the Project, or any part thereof, or that un

foreseen developments may not occur. At the Owner's request, the Contractor shall make available to the Owner the results of any Site investigation, test borings, analyses, studies or other tests conducted by or in the possession of the Contractor or any of its agents. Nothing herein contained shall be deemed a waiver by the Contractor to pursue any available legal right or remedy it may have at any time against any third party who may have prepared any report and/or test relied upon by the Contractor.

2.2.4 UTILITY SURVEY

When required by the scope of the Project, the Owner will furnish, at its expense, all information regarding known existing utilities on or adjacent to the Site, including location, size, inverts, and depths.

2.2.5 INFORMATION

Upon the request of the Contractor, Owner will make available such existing information regarding utility services and Site features, including existing construction, related to the Project as is available from Owner's records. The Contractor may not rely upon the accuracy of any such information, other than that provided under Sections 2.2.2 and 2.2.4 (except that the Contractor may not rely upon and must question in writing to the Owner and the Architect any information which appears incorrect based upon Contractor's Site inspection, knowledge of the Work and Project, and prior experience with similar projects), unless specifically stated in writing that the Contractor may rely upon the designated information.

2.2.6 EXISTING UTILITY LINES; REMOVAL, RELOCATION

2.2.6.1 *Removal, Relocation.* Pursuant to Government Code section 4215, the Owner assumes the responsibility for removal, relocation, and protection of utilities located on the Site at the time of commencement of construction under this Contract with respect to any such utility facilities which are not identified in the drawings and specifications made part of the invitation to bid. The Contractor shall not be assessed for liquidated damages for delay in Completion of the Work caused by failure of the Owner to provide for removal or relocation of such utility facilities. Owner shall compensate the Contractor for the costs of locating, repairing damage not due to the failure of the Contractor to exercise reasonable care, removing or relocating such utility facilities, and for equipment necessarily idle during such work.

2.2.6.2 *Assessment.* These subparagraphs shall not be construed to preclude assessment against the Contractor for any other delays in Completion of the Work. Nothing in these subparagraphs shall be deemed to require the Owner 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, or meter junction boxes on or adjacent to the Site.

2.2.6.3 *Notification.* If the Contractor, while performing work under this Contract, discovers utility facilities not identified by the Owner in the Contract plans or specifications, Contractor shall immediately notify the Owner and the utility in writing.

2.2.6.4 *Underground Utility Clearance.* It shall be Contractor's sole responsibility to timely notify all public and private utilities serving the Site prior to commencing work. The Contractor shall notify and receive clearance from any cooperative agency, such as Underground Service Alert, in accordance with Government Code section 4216, et seq. Contractor shall promptly provide a copy of all such notifications to the Owner.

2.2.7 EASEMENTS

Owner shall secure and pay for easements for permanent structures or permanent changes in existing facilities, if any, unless otherwise specified in the Contract or Contract Documents.

2.2.8 REASONABLE PROMPTNESS

Information or services under Owner's control will be furnished by the Owner with reasonable promptness. The Owner shall not be liable for any delays caused by factors beyond the Owner's control including but not limited to DSA's or any other local, State or federal agency's review of bids, change order requests, RFI's or any other documents.

2.2.9 COPIES FURNISHED

The Contractor will be furnished such copies of Drawings and Project Manuals as are stated in the Contract Documents.

2.2.10 DUTIES CUMULATIVE

The foregoing are in addition to other duties and responsibilities of the Owner enumerated herein, and especially those in Article 6 (Construction by Owner or by Separate Contractors), Article 9 (Payments and Completion), and Article 11 (Insurance and Bonds).

2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents, or persistently fails to carry out Work in accordance with the Contract Documents, the Owner may order the Contractor to stop the Work or any portion thereof, until the Contractor corrects the deficiencies. Contractor shall not be entitled to a time extension for any delays caused by such order. The right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Article 6.

2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor fails or refuses to carry out the Work in accordance with the Contract Documents, Owner may correct such deficiencies by whatever reasonable method the Owner may deem expedient without prejudice to other remedies the Owner may have, including but not limited to having another contractor perform some or all of the Work without terminating the

Contract with Contractor. Owner may exercise this right at any time during the Contractor's Work.

Owner shall first provide written notice to Contractor of Contractor's failure or refusal to perform. The notice will provide the time period within which Contractor must begin correction of the failure or refusal to perform. If the Contractor fails to begin correction within the stated time, or fails to continue correction, the Owner may proceed to correct the deficiencies. In the event the Owner bids the work, Contractor shall not be eligible for the award of the contract. The Contractor may be invoiced the cost to Owner of the work, including compensation for additional professional and internally generated services and expenses made necessary by Contractor's failure or refusal to perform. Owner may withhold that amount from the retention, or progress payments due the Contractor, pursuant to Section 9.5. If retention and payments withheld then or thereafter due the Contractor are not sufficient to cover that amount, the Contractor shall pay the difference to the Owner.

ARTICLE 3

THE CONTRACTOR

3.1 DEFINITION

The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Contractor" means the Contractor or the Contractor's authorized representative. To the extent that any portion of the Work is provided with the Contractor's own forces, any reference to Subcontractors shall be equally applicable to the Contractor.

3.2 SUPERVISION AND CONSTRUCTION PROCEDURES

3.2.1 CONTRACTOR

The Contractor shall supervise and direct the Work using the Contractor's best skill and attention, which shall meet or exceed the standards in the industry. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, procedures, and coordinating all portions of the Work under the Contract, unless Contract Documents give other specific instructions concerning these matters.

If part of the Project is performed by other contractors that Owner directly retains, Owner shall schedule and coordinate the activities of Contractor with the other contractors. Contractor agrees to accept the Owner's construction schedules, schedule updates, overall sequence and coordination of construction for the Project.

Contractor realizes that work by other contractors or Owner may occur simultaneously with Contractor's Work in any given area. Contractor is responsible for its own sequences that may occur within a given activity or set of activities. Contractor shall not commit or permit any act which will adversely affect the work of any other contractor or Owner. Contractor shall provide

layout of its Work at the request of any other contractor or Owner.

Specific duties of the Contractor shall be in accordance with Title 24 of the California Code of Regulations. Contractor shall fully comply with any and all reporting requirements of Education Code sections 17309 and 81141 in the manner prescribed by Title 24.

3.2.2 CONTRACTOR RESPONSIBILITY

The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors, material and equipment suppliers, and their agents, employees, invitees, and other persons performing portions of the Work under direct or indirect contract with the Contractor or any of its Subcontractors.

3.2.3 OBLIGATIONS NOT CHANGED BY OTHERS' ACTIONS

The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents by the activities or duties of the Owner's representatives, including but not limited to any construction manager and the Architect, or the Inspector of Record; or by tests, inspections, or approvals required or performed by persons other than the Contractor.

3.2.4 CONTRACTOR RESPONSIBILITY FOR READINESS FOR WORK

The Contractor shall be responsible for inspection of Work already performed under the Contract Documents to determine that such portions are in proper condition to receive subsequent work.

3.2.5 PROJECT MEETINGS

During its Work, Contractor shall attend Owner's Project meetings as scheduled by the Contract Documents, or as otherwise instructed by Owner, to discuss the current status of the Work and Project and the future progress of the Work and the Project. Contractor shall have five (5) days after receipt of Owner's Project meeting minutes to provide written objections and suggested corrections.

3.3 SUPERINTENDENT

3.3.1 FULL TIME SUPERINTENDENT

The Contractor shall provide a competent superintendent and assistants as necessary, all of whom shall be reasonably proficient in speaking, reading and writing English and, who shall be in attendance at the Project Site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

3.3.2 STAFF

The Contractor and each Subcontractor shall: furnish a competent and adequate staff as

necessary for the proper administration, coordination, supervision, and superintendence of its portion of the Work; organize the procurement of all materials and equipment so that the materials and equipment will be available at the time they are needed for the Work; and keep an adequate force of skilled workers on the job to Complete the Work in accordance with all requirements of the Contract Documents.

3.3.3 RIGHT TO REMOVE

Owner shall have the right, but not the obligation, to require the removal from the Project of any superintendent, staff member, agent, or employee of any Contractor, Subcontractor, material or equipment supplier, etc., for cause.

3.4 LABOR AND MATERIALS

3.4.1 CONTRACTOR TO PROVIDE

Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, material, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and Completion of the Work whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. Owner shall have no responsibility for security of, or repair or replacement costs of, any and all material, equipment, tools, construction equipment, and machinery provided by Contractor pursuant to this Subsection.

3.4.2 QUALITY

Unless otherwise specified, all materials and equipment to be permanently installed in the Project shall be new and shall be of such quality as required to satisfy the standards of the Contract Documents. The Contractor shall, if requested, promptly furnish satisfactory evidence as to kind and quality of all materials and equipment. All labor shall be performed by workers skilled in their respective trades, and the quality of their work shall meet whichever is the higher standard for their work: the standard in the industry or the standard in the Contract Documents.

3.4.3 REPLACEMENT

Any work, materials, or equipment, which does not conform to these standards may be disapproved and rejected by the Owner, in which case, they shall be removed and replaced by the Contractor at no cost to the Owner.

3.4.4 DISCIPLINE

The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Contract in accordance with paragraph 5.5.1 including, but not limited to, Subcontractors, and material or equipment suppliers retained for the Project.

3.5 WARRANTY

For the period of one (1) year after Completion of the Work (see Sections 9.7.1, 12.2.5 and 12.2.6), the Contractor warrants to the Owner that material and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contractor's warranty does not cover damage or defect caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage. If required by the Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

3.6 TAXES

Contractor will pay all applicable Federal, State, and local taxes on all materials, labor, or services furnished by it, and all taxes arising out of its operations under the Contract Documents. Owner is exempt from Federal Excise Tax, and a Certificate of Exemption shall be provided upon request.

3.7 PERMITS, FEES AND NOTICES

3.7.1 PAYMENT

The Contractor shall secure and pay for all permits and governmental fees, licenses, and inspections necessary for proper execution and Completion of the Work which are customarily secured after execution of the Contract and are legally required by any authority having jurisdiction over the Project, except those required by the Division of the State Architect (DSA). Owner shall be responsible for all testing and inspection as required by the DSA on-Site or within the distance limitations set forth in paragraph 13.5.2, unless a different mileage range is specified in the Contract Documents.

3.7.2 COMPLIANCE

The Contractor shall comply with and give notices required by any law, ordinance, rule, regulation, and lawful order of public authorities bearing on performance of the Work.

3.7.3 CONTRACT DOCUMENTS

It is not the Contractor's responsibility to ascertain that the Contract Documents are in accordance with any applicable law, statute, ordinance, building codes, rule, or regulation. However, if the Contractor knew, or should have known, or observes that portions of the Contract Document are at variance therewith, the Contractor shall promptly notify the Architect, any construction manager, and Owner in writing, and necessary changes shall be accomplished

by appropriate modification.

3.7.4 RESPONSIBILITY

If the Contractor performs any work that it knows, or should have known, is contrary to any law, statute, ordinance, building code, rule or regulation, the Contractor shall assume full responsibility for such work, and shall bear the attributable cost of correction and delays to the Work, other contractors' work, and the Project.

3.8 ALLOWANCES

3.8.1 CONTRACT

The Contractor shall include in the Contract Sum all allowances, including any general contingency allowance, stated in the Contract Documents. Items covered by specific allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities against whom the Contractor makes reasonable and timely objection.

3.8.2 SCOPE

3.8.2.1 **Prompt Selection.** Materials and equipment under an allowance shall be selected promptly by the Owner to avoid delay to the Work.

3.8.2.2 **Cost.** Allowances shall cover the cost to the Contractor of materials and equipment delivered at the Site and all required taxes, less applicable trade discounts, etc., as delineated in paragraph 7.7.4.

3.8.2.3 **Cost Included in Contract Sum.** Contractor's costs for unloading and handling at the Site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum and not in the allowances.

3.8.2.4 **Contract Sum Adjustment.** Whenever Contractor seeks payment from an allowance and the requested costs are approved by Owner as compliant with the Contract Documents (including Sections 3.8.2.2 and 3.8.2.3, above), Owner may elect to pay the approved costs from the allowance, or pay the costs via Change Order. Any such allowance payment shall conform to the requirements of the Agreement and other Contract Documents.

3.9 CONTRACTOR'S CONSTRUCTION SCHEDULES

3.9.1 REQUIREMENTS

Before the Contractor's commencement of Work or within two (2) weeks of award of the Contract, whichever is earlier, Contractor shall prepare and submit for the Owner's, and any construction manager's, information the baseline construction schedule for the Work, which

shall conform to the Contract Documents' requirements.

Contractor shall submit an updated schedule by the first day of every month, and whenever else requested by the Owner. Each schedule update must include an accurate as-built schedule and the current as-planned schedule, both of which shall conform to the Contract Documents' requirements. Contractor shall submit its daily logs for the prior month with the updated schedule.

The original schedule and all updates shall conform, at a minimum, to industry standards for (a) critical path scheduling and (b) facilitation of Owner's Project management and evaluation of Contractor Claims for additional money or time.

The original schedule and all updates shall not exceed time limits (including milestone deadlines) under the Contract Documents and shall comply with the Contract Documents scheduling requirements and with any scheduling requirements the Owner provides to the Contractor at the beginning of the Work. The original schedule and all updates shall accurately reflect Work performed to date, reasonable dates for future Work; all construction activities (including procurement); the critical path schedule for Completion of the remainder of the Work; the logic, sequencing, and relationship between the construction activities, including each activity's predecessor and successor activities; and the percentage of the Work completed. The original schedule and all updates shall include a reasonable number of days for weather that is usual or common for each month, as time extensions are not available for such days (see Sections 4.5.5.3.2 and 8.4.1, below); and any failure by Contractor to include a reasonable number of such days, or by Owner to require Contractor to include a reasonable number of such days, shall not affect the reasonable number of such days to be used when determining time extensions under Sections 4.5.5.3.2 and 8.4.1, below.

The construction schedule shall be in the form of either a tabulation, chart, or graph, unless otherwise stated in Division 1 of the Specifications, and shall be in sufficient detail to show the chronological relationship of all activities of the Work including, but not limited to, estimated starting and completion dates of various activities, (including early and late dates and reasonable float for each activity), procurement of materials, the critical path, and scheduling of equipment. Float suppression techniques such as preferential sequencing, special lead/lag logic restraints, extended activity durations, or imposed dates shall be apportioned for the benefit of the Work. Whenever in the Contract Documents Contractor is required to provide a schedule and/or schedule updates, the Contractor shall provide the schedule and updates in electronic format as well as hard copy. Contractor shall be solely responsible for the accuracy, utility and reasonableness of all of its schedules. Owner's acceptance, approval or non-rejection of Contractor's schedules shall not affect Contractor's responsibility for its schedules.

The Contractor and Owner shall use any float on a "first come, first served" basis. The original schedule and updates shall reflect Contractor's and Owner's use of float. Float is not for the exclusive use or benefit of either Owner or Contractor, but it is a jointly owned expiring Work resource available to both parties as needed to meet schedule milestones. For the original schedule and updates, Contractor shall use a critical path network format with the critical paths clearly indicated. Contractor shall use an MS Project, Primavera, or an equivalent or better

program. Contractor shall include reports that sort and list the activities in order of increasing float and by early and late start dates. Contractor shall endeavor to label ten to thirty percent (10-30%) of the tasks as critical, but shall not label less than five (5%) or more than fifty (50%) as critical. Contractor shall use calendar days.

If any change in Contractor's method of operations will cause a change in the construction schedule, Contractor shall submit to Owner, Architect, and any construction manager, a revised construction schedule within seven (7) days of the change.

If, in the Owner's opinion, the Contractor is not prosecuting the Work at a rate sufficient to meet the Work schedule or a contractual milestone, or to Complete the Work within the Contract Time as adjusted by change orders or if the Contractor's actual progress falls behind the Work schedule or it is apparent to Owner that Contractor will not meet contractual milestones or Complete the Work within the Contract Time (as adjusted by change orders), the Owner may require that the Contractor prepare and submit a recovery plan. Contractor must submit a recovery plan within seven (7) days of a demand for the plan. At a minimum, the recovery plan must include a proposed schedule that shows Completion of the Work by the contractual milestones and within the Contract Time, as adjusted by change orders, or Completion by other dates Owner specifies in the demand for a recovery plan. The recovery plan shall state the corrective actions Contractor will undertake to implement it. The recovery plan shall also list any additional money that Contractor believes it should receive if Owner orders Contractor to fully or partially implement the recovery plan. If the Owner orders Contractor to implement the recovery plan, Contractor shall do so, but the order shall not constitute an admission by Owner that Contractor is entitled to additional money. To recover additional money, Contractor must comply with General Conditions Articles 4.5, 7 and 8.

All schedules Contractor submits shall be certified as true and correct, as follows:

I, _____ [*name of declarant*], declare the following:

_____ [*Contractor company name*] has contracted with _____ [*public entity name*] for the _____ Contract ("Contract").
_____ [*Contractor company name*] authorized me to prepare schedules for _____ [*public entity name*] for this Project, and I prepared the attached schedule. I am the most knowledgeable person at _____ [*Contractor company name*] regarding the scheduling of the Work for this Contract.

The attached schedule does not breach the Contract between _____ [*Contractor company name*] and _____ [*public entity name*] for this Project, does not violate any applicable law, satisfies all provisions of the Contract applicable to submission of schedules, only contains truthful and accurate as-built and as-planned dates of the Work (including supporting data), and is not a false claim.

The attached schedule is submitted in compliance with all laws applicable to submission of a Claim, including but not limited to California Penal Code section 72 (Fraudulent Claims), Government Code sections 12650 et seq. (False Claims Act; for example, Government Code section 12651(a)(7)), and Business and Professions Code sections 17200 et seq. (Unfair Business Practices Act). I am aware that submission or certification of false claims, or other Claims that violate law or the Contract, may lead to fines, imprisonment, and/or other serious legal consequences for myself and/or _____ [*Contractor company name*].

While preparing this declaration and schedule I consulted with others (including attorneys, consultants, or others who work for _____ [*Contractor company name*]) when necessary to ensure that the statements were true and correct.

I declare under the penalty of perjury under the laws of the State of California that the foregoing is true and correct. Executed _____, 20____, at _____, California.

[signature]
[name of declarant]

3.9.2 DSA OVERSIGHT PROCESS

In connection with the DSA Construction Oversight Process which includes inspection cards and review of changes to the DSA-approved construction documents, the Contractor must (a) include specific tasks in its baseline schedule to take into account these procedures since they are critical path issues; and (b) include a reasonable amount of float in the baseline schedule to accommodate the additional time required by these DSA procedures.

3.9.3 FAILURE TO MEET REQUIREMENTS

Failure of the Contractor to provide proper schedules may, at the sole discretion of Owner, constitute either grounds to withhold, in whole or in part, progress payments to the Contractor, or a breach of contract allowing Owner to terminate the Contract.

3.10 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the Site for the Owner one applicable copy of Titles 19 and 24 and record copy of the Drawings, Specifications, Addenda, Change Orders, and other Modifications, in good order and marked currently to record changes and selections made during construction. In addition, the Contractor shall maintain at the Site approved Shop Drawings,

Product Data, Samples, and similar required submittals. These documents shall be available to the Owner and shall be delivered to the Owner, or the Architect for delivery to the Owner, upon Completion of the Work.

3.11 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

3.11.1 SUBMITTALS DEFINED

3.11.1.1 **Shop Drawings.** The term “shop drawings” as used herein means drawings, diagrams, schedules, and other data, which are prepared by Contractor, Subcontractors, manufacturers, suppliers, or distributors illustrating some portion of the Work, and includes: illustrations; fabrication, erection, layout and setting drawings; manufacturer’s standard drawings; schedules; descriptive literature, instructions, catalogs, and brochures; performance and test data including charts; wiring and control diagrams; and all other drawings and descriptive data pertaining to materials, equipment, piping, duct and conduit systems, and methods of construction as may be required to show that the materials, equipment, or systems and their position conform to the requirements of the Contract Documents. The Contractor shall obtain and submit with the shop drawings all seismic and other calculations and all product data from equipment manufacturers. “Product data” as used herein are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate a material, product, or system for some portion of the Work. As used herein, the term “manufactured” applies to standard units usually mass-produced, and “fabricated” means items specifically assembled or made out of selected materials to meet individual design requirements. Shop drawings shall: establish the actual detail of all manufactured or fabricated items, indicate proper relation to adjoining work, amplify design details of mechanical and electrical systems and equipment in proper relation to physical spaces in the structure, and incorporate minor changes of design or construction to suit actual conditions.

3.11.1.2 **Samples.** The term “samples” as used herein are physical examples furnished by Contractor to illustrate materials, equipment, or quality and includes natural materials, fabricated items, equipment, devices, appliances, or parts thereof as called for in the Specifications, and any other samples as may be required by the Owner to determine whether the kind, quality, construction, finish, color, and other characteristics of the materials, etc., proposed by the Contractor conform to the required characteristics of the various parts of the Work. All Work shall be in accordance with the approved samples.

3.11.1.3 **Contractor’s Responsibility.** Contractor shall obtain and shall submit to Architect all required shop drawings and samples in accordance with Contractor’s “Schedule for Submission of Shop Drawings and Samples” provisions in Division 1 of the Specifications and in accordance with the Contractor’s original and updated schedules, and with such promptness as to cause no delay in its own Work or in that of any other contractor, Owner or subcontractor but in no event later than ninety (90) days after the execution of the Agreement. Contractor may be assessed \$100 a day for each day it is late in submitting a shop drawing or sample. No extensions of time will be granted to Contractor or any Subcontractor because of its failure to have shop drawings and samples submitted in accordance with the Schedule. Each Subcontractor shall submit all shop drawings, samples, and manufacturer’s descriptive data for the review of the Owner, the Contractor, and the Architect through the Contractor. By submitting shop drawings, product data, and samples, the Contractor or submitting party (if other th

an Contractor) represents that it has determined and verified all materials, field measurements, field conditions, catalog numbers, related field construction criteria, and other relevant data in connection with each such submission, and that it has checked, verified, and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents. At the time of submission, any deviation in the shop drawings, product data, or samples from the requirements of the Contract Documents shall be narratively described in a transmittal accompanying the submittal. However, submittals shall not be used as a means of requesting a substitution, the procedure for which is defined in paragraph 3.11.4, "Substitutions." Review by Owner and Architect shall not relieve the Contractor or any Subcontractor from its responsibility in preparing and submitting proper shop drawings in accordance with the Contract Documents. Contractor shall stamp, sign, and date each submittal indicating its representation that the submittal meets all of the requirements of the Contract Documents. Any submission, which in Owner's or Architect's opinion is incomplete, contains numerous errors, or has been checked only superficially by Contractor will be returned unreviewed for resubmission by the Contractor.

3.11.1.4 ***Extent of Review.*** In reviewing shop drawings, the Owner will not verify dimensions and field conditions. The Architect will review and approve shop drawings, product data, and samples for aesthetics and for conformance with the design concept of the Work and the information given in the Contract Documents. The Architect's review shall neither be construed as a complete check nor relieve the Contractor, Subcontractor, manufacturer, fabricator, or supplier from responsibility for any deficiency that may exist or from any departures or deviations from the requirements of the Contract Documents unless the Contractor has, in writing, called the Architect's attention to the deviations at the time of submission and the Architect has given specific written approval. The Architect's review shall not relieve the Contractor or Subcontractors from responsibility for errors of any sort in shop drawings or schedules, for proper fitting of the Work, or from the necessity of furnishing any Work required by the Contract Documents, which may not be indicated on shop drawings when reviewed. Contractor and Subcontractors shall be solely responsible for determining any quantities, whether or not shown on the shop drawings.

3.11.2 DRAWING SUBMISSION PROCEDURE

3.11.2.1 ***Transmittal Letter and Other Requirements.*** All shop drawings must be properly identified with the name of the Project and Contractor's name and dated, and each lot submitted must be accompanied by a letter of transmittal referring to the name of the Project and Contractor and to the Specification section number for identification of each item clearly stating in narrative form, as well as "clouding" on the submissions, all qualifications, departures, or deviations from the Contract Documents, if any. Shop drawings, for each section of the Work, shall be numbered consecutively, and the numbering system shall be retained throughout all revisions. All Subcontractor submissions shall be made through the Contractor. Each drawing shall have a clear space for the stamps of Architect and Contractor. Only shop drawings required to be submitted by the Contract Documents shall be reviewed.

3.11.2.2 ***Copies Required.*** Each submittal, other than digital, shall include one (1) legible, reproducible sepia and five (5) legible prints of each drawing, including fabrication, er

ection, layout and setting drawings, and such other drawings as required under the various sections of the Specifications until final acceptance thereof is obtained. Subcontractor shall submit copies, in an amount as requested by the Contractor, of: manufacturers' descriptive data for materials, equipment, and fixtures, including catalog sheets showing dimensions, performance, characteristics, and capacities; wiring diagrams and controls; schedules; all seismic calculations and other calculations; and other pertinent information as required. Digital submissions are the preferred delivery method.

3.11.2.3 **Corrections.** The Contractor shall make any corrections required by Architect and shall resubmit as required by Architect the required number of corrected copies of shop drawings or new samples until approved. Contractor shall direct specific attention in writing or on resubmitted shop drawings to revisions other than the corrections required by the Architect on previous submissions. Professional services required for more than one (1) re-review of required submittals of shop drawings, product data, or samples are subject to charge to the Contractor pursuant to paragraph 4.4.

3.11.2.4 **Approval Prior to Commencement of Work.** No portion of the Work requiring a shop drawing or sample submission shall be commenced until the submission has been reviewed by Owner and approved by Architect unless specifically directed in writing by the Owner. All such portions of the Work shall be in accordance with approved shop drawings and samples.

3.11.3 SAMPLE SUBMISSIONS PROCEDURE

3.11.3.1 **Samples Required.** In case a considerable range of color, graining, texture, or other characteristics may be anticipated in finished products, a sufficient number of samples of the specified materials shall be furnished by the Contractor to indicate the full range of characteristics, which will be present in the finished products; and products delivered or erected without submittal and approval of full range samples shall be subject to rejection. Except for range samples, and unless otherwise called for in the various sections of the Specifications, samples shall be submitted in duplicate. All samples shall be marked, tagged, or otherwise properly identified with the name of the submitting party, the name of the Project, the purpose for which the samples are submitted, and the date and shall be accompanied by a letter of transmittal containing similar information, together with the Specification section number for identification of each item. Each tag or sticker shall have clear space for the review stamps of Contractor and Architect.

3.11.3.2 **Labels and Instructions.** Samples of materials, which are generally furnished in containers bearing the manufacturers' descriptive labels and printed application instructions, shall, if not submitted in standard containers, be supplied with such labels and application instructions.

3.11.3.3 **Architect's Review.** The Architect will review and, if appropriate, approve submissions and will return them to the Contractor with the Architect's stamp and signature applied thereto, indicating the appropriate action in compliance with the Architect's standard procedures.

3.11.3.4 **Record Drawings and Annotated Specifications.** The Contractor will prepare and maintain on a current basis an accurate and complete set of Record Drawings showing clearly all changes, revisions, and substitutions during construction, including, without limitation, field changes and the final location of all mechanical equipment, utility lines, ducts, outlets, structural members, walls, partitions, and other significant features, and Annotated Specifications showing clearly all changes, revisions, and substitutions during construction. A copy and one digital copy of such Record Drawings and Annotated Specifications will be delivered to Owner in accordance with the schedule prepared by Contractor. In the event of a specification that allows Contractor to elect one of several brands, makes, or types of material or equipment, the annotations shall show which of the allowable items the Contractor has furnished. The Contractor will update the Record Drawings and Annotated Specifications as often as necessary to keep them current but no less often than weekly. The Record Drawings and Annotated Specifications shall be kept at the Site and available for inspection by the Owner, Inspector of Record and the Architect. On Completion of the Contractor's Work and prior to Application for Final Progress Payment, the Contractor will provide one complete set of Record Drawings and Annotated Specifications and one digital copy to the Owner, certifying them to be a complete and accurate reflection of the actual construction conditions of the Work.

3.11.3.5 **Equipment Manuals.** Contractor shall obtain and furnish to the Owner a digital copy of a complete set of a manual containing the manufacturers' instructions for maintenance and operation of each item of equipment and apparatus furnished under the Contract Documents and any additional data specifically requested under the various sections of the Specifications for each division of the Work. The manual shall be arranged in proper order and indexed. At the Completion of its Work, the Contractor shall certify, by endorsement thereon, that the manual is complete, accurate, and covers all of its work prior to submittal of Contractor's Application for Final Progress Payment.

3.11.3.6 **Owner's Property.** All shop drawings and samples submitted shall become the Owner's property.

3.11.4 SUBSTITUTIONS

3.11.4.1 **One Product Specified.** Unless the Specifications state that no substitution is permitted, whenever in the Contract Documents any specific article, device, equipment, product, material, fixture, patented process, form, method, or type of construction is indicated or specified by name, make, trade name, or catalog number, with or without the words "or equal," such specification shall be deemed to be used for the purpose of facilitating description of material, process, or article desired and shall be deemed to be followed by the words "or equal." Contractor may, unless otherwise stated, offer any material, process, or article, which shall be substantially equal or better in every respect to that so indicated or specified and will completely accomplish the purpose of the Contract Documents.

3.11.4.2 **Two or More Products Specified.** When two or more acceptable products are specified for an item of the Work, the choice will be up to the Contractor. Contractor shall utilize the same product throughout the Project. If a timely substitution request as set forth in Se

ction 3.11.4.3 is not provided and an “or equal” substitution is requested, the Owner may consider the substitution if the product specified is no longer commercially available. If the Owner allows the substitution to be proposed pursuant to such an untimely request, the Contractor will be responsible for the professional fees incurred by the Architect or Architect’s consultants in reviewing the proposed substitution which fees may be withheld from progress payments and/or retention.

3.11.4.3 ***Substitution Request Form.*** Requests for substitutions of products, materials, or processes other than those specified must be made on the Substitution Request form available from the Owner prior to the date of the bid opening. Any Requests submitted less than fourteen (14) days prior to the date of the bid opening will not be considered, except as noted in paragraph 3.11.4.2. A Substitution Request must be accompanied by evidence as to whether or not the proposed substitution: is equal in quality and serviceability to the specified item; will entail no changes in detail and construction of related work; will be acceptable in consideration of the required design and artistic effect; will provide no cost disadvantage to Owner; and will require no excessive or more expensive maintenance, including adequacy and availability of replacement parts. The burden of proof of these facts shall be upon the Contractor. The Contractor shall furnish with its request sufficient information to determine whether the proposed substitution is equivalent including but not limited to all drawings, specifications, samples, performance data, calculations, and other information as may be required to assist the Architect and the Owner in determining whether the proposed substitution is acceptable. The final decision shall be the Owner’s. The written approval of the Owner, consistent with the procedure for Change Orders, shall be required for the use of a proposed substitute material. Owner may condition its approval of the substitution upon delivery to Owner of an extended warranty or other assurances of adequate performance of the substitution. If Contractor requests substitutions that require approval by the Division of the State Architect (“DSA”) or another governmental entity with jurisdiction, Contractor shall bear all risks of delay.

3.11.4.4 ***List of Manufacturers and Products Required.*** The Subcontractor shall prepare and submit to the Contractor within thirty (30) days of execution of the Subcontract comprehensive lists, in quadruplicate, of the manufacturers and products proposed for the Project, including information on materials, equipment, and fixtures required by the Contract Documents, as may be required for Contractor’s or Architect’s preliminary approval. Approval of such lists of products shall not be construed as a substitute for the shop drawings, manufacturer’s descriptive data, and samples, which are required by the Contract Documents, but rather as a base from which more detailed submittals shall be developed for the final review of the Contractor and the Architect.

3.11.5 DEFERRED APPROVALS

Deferred approvals shall be submitted and processed pursuant to the requirements of Division 1 of the Specifications. All risks of delay due to the Division of the State Architect’s, or any other governmental agency having jurisdiction, approval of a deferred approval shall be on the requesting party.

3.12 CUTTING AND PATCHING

3.12.1 SCOPE

The Contractor shall be responsible for cutting, fitting, or patching required to Complete the Work or to make its parts fit together properly.

3.12.2 CONSENT

The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or a separate contractor by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work. All cutting shall be done promptly, and all repairs shall be made as necessary.

3.12.3 STRUCTURAL MEMBERS

New or existing structural members and elements, including reinforcing bars and seismic bracing, shall not be cut, bored, or drilled except by written authority of the Architect. Work done contrary to such authority is at the Contractor's risk, subject to replacement at its own expense and without reimbursement under the Contract. Agency approvals shall be obtained by the Architect, not by the Contractor.

3.12.4 SUBSEQUENT REMOVAL

Permission to patch any areas or items of the Work shall not constitute a waiver of the Owner's or the Architect's right to require complete removal and replacement of the areas or items of the Work if, in the opinion of the Architect or the Owner, the patching does not satisfactorily restore quality and appearance of the Work or does not otherwise conform to the Contract Documents. Any costs caused by defective or ill-timed cutting or patching shall be borne by the person or entity responsible.

3.13 CLEANING UP

3.13.1 CONTRACTOR'S RESPONSIBILITY

The Contractor shall keep the Site and surrounding area free from accumulation of waste material or rubbish caused by operations under the Contract. The Site shall be maintained in a neat and orderly condition. All crates, cartons, paper, and other flammable waste materials shall be removed from Work areas and properly disposed of at the end of each day. The Contractor shall continuously remove from and about the Site the waste materials, rubbish, tools, construction equipment, machinery, and materials no longer required for the Work.

3.13.2 FAILURE TO CLEANUP

If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so, without prior notice to the Contractor and the cost thereof shall be invoiced to the Contractor and withheld from progress payments and/or retention. Each Subcontractor shall have the responsibility for the cleanup of its own Work. If the Subcontractor fails to clean up, the Contractor must do so.

3.13.3 CONSTRUCTION BUILDINGS

When directed by the Owner or the Architect, Contractor and Subcontractor shall dismantle temporary structures, if any, and remove from the Site all construction and installation equipment, fences, scaffolding, surplus materials, rubbish, and supplies belonging to Contractor or Subcontractor. If the Contractor does not remove the tools, equipment, machinery, and materials within fifteen (15) days after Completion of its Work, then they shall be deemed abandoned, and the Owner can dispose of them for its own benefit in whatever way it deems appropriate. Contractor shall pay for any costs to dispose of the items.

3.14 ACCESS TO WORK

The Contractor shall provide the Owner, the Architect, and the Inspector of Record, access to the Work in preparation and progress wherever located.

3.15 ROYALTIES AND PATENTS

3.15.1 PAYMENT AND INDEMNITY

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims of infringement of patent rights and shall hold the Owner and the Architect harmless and indemnify them, to the extent not caused by the Owner's active negligence, sole negligence or willful misconduct, from loss on account thereof but shall not be responsible for such defense or loss when a particular design, process, or product of a particular manufacturer is required by the Contract Documents. However, if the Contractor has reason to believe the required design, process, or product is an infringement of a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Owner and Architect.

3.15.2 REVIEW

The review by the Owner or Architect of any method of construction, invention, appliance, process, article, device, or material of any kind shall be for its adequacy for the Work and shall not be an approval for the use by the Contractor in violation of any patent or other rights of any person or entity.

3.16 INDEMNIFICATION

3.16.1 SCOPE: CONTRACTOR

To the fullest extent permitted by law, the Contractor shall defend, indemnify, and hold harmless the Owner, any construction manager, Architect, Architect's consultants, the Inspector of Record, the State of California, and their respective agents, employees, officers, volunteers, Boards of Trustees, members of the Boards of Trustees, and directors ("Indemnitees"), from and against claims, actions, damages, liabilities, losses (including but not limited to injury or death of persons, property damage, and compensation owed to other parties), and expenses (including but not limited to attorneys' fees and costs including fees of consultants) alleged by third parties against Indemnitees arising out of or resulting from the following: Contractor's, its Subcontractors', or its suppliers' performance of the Work, including but not limited to the Contractor's or its Subcontractors' use of the Site; the Contractor's or its Subcontractors' construction of the Project, or failure to construct the Project, or any portion thereof; the use, misuse, erection, maintenance, operation, or failure of any machinery or equipment including, but not limited to, scaffolds, derricks, ladders, hoists, and rigging supports, whether or not such machinery or equipment was furnished, rented, or loaned by any of the Indemnitees; or any act, omission, negligence, or willful misconduct of the Contractor or its Subcontractors or their respective agents, employees, material or equipment suppliers, invitees, or licensees but only to the extent caused in whole or in part by the acts or omissions of the Contractor, its Subcontractors, its suppliers, anyone directly or indirectly employed by any of them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity, which would otherwise exist as to a party, person, or entity described in this paragraph. The obligation to defend, indemnify and hold harmless includes any claims or actions by third parties arising out of or resulting from Labor Code section 2810. Contractor shall have no obligation to defend or indemnify the Indemnitees against claims, actions, damages, liabilities, losses, and expenses caused by the active negligence, sole negligence or willful misconduct of Indemnitees. This indemnification shall apply to all liability, as provided for above, regardless of whether any insurance policies are applicable, and insurance policy limits do not act as a limitation upon the amount of the indemnification to be provided by the Contractor.

3.16.2 SCOPE: SUBCONTRACTORS

3.16.2.1 *Indemnity.* The Subcontractors shall defend, indemnify, and hold harmless the Indemnitees from and against claims, actions, damages, liabilities, and losses (including but not limited to injury or death of persons, property damage, and compensation owed to other parties), and expenses (including but not limited to attorneys' fees and costs including fees of consultants) alleged by third parties against Indemnitees arising out of or resulting from the following: Subcontractors' performance of the Work, including but not limited to the Subcontractors' use of the Site; the Subcontractors' construction of the Project or failure to construct the Project or any portion thereof; the use, misuse, erection, maintenance, operation, or failure of any machinery or equipment, including, but not limited to, scaffolds, derricks, ladders, hoists, and rigging supports, whether or not such machinery or equipment was furnished, rented, or loaned by any of the Indemnitees; or any act, omission, negligence, or willful misconduct of the Subcontractors or their respective agents, employees, material or equipment suppliers, invitees, or licensees but only to the extent caused in whole or in part by the acts or omissions of the Subcontractors, an

yone directly or indirectly employed by any of them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity, which would otherwise exist as to a party, person, or entity described in this paragraph. This obligation to defend, indemnify and hold harmless includes any claims or actions by third parties arising out of or resulting from Labor Code section 2810. Subcontractors shall have no obligation to defend or indemnify the Indemnitees against claims, actions, damages, liabilities, losses, and expenses caused by the active negligence, sole negligence or willful misconduct of Indemnitees. This indemnification shall apply to all liability, as provided for above, regardless of whether any insurance policies are applicable, and insurance policy limits do not act as a limitation upon the amount of the indemnification to be provided by the Subcontractors.

3.16.2.2 ***Joint and Several Liability.*** In the event more than one Subcontractor is connected with an accident or occurrence covered by this indemnification, then all such Subcontractors shall be jointly and severally responsible to each of the Indemnitees for indemnification, and the ultimate responsibility among such indemnifying Subcontractors for the loss and expense of any such indemnification shall be resolved without jeopardy to any Indemnitee. The provisions of the indemnity provided for herein shall not be construed to indemnify any Indemnitee for its own negligence if not permitted by law or to eliminate or reduce any other indemnification or right which any Indemnitee has by law or equity.

3.16.3 NO LIMITATION

The Contractor's and the Subcontractor's obligation to indemnify and defend the Indemnitees hereunder shall include, without limitation, any and all claims, damages, and costs: for injury to persons and property (including loss of use), and sickness, disease or death of any person; for breach of any warranty, express or implied; for failure of the Contractor or the Subcontractor to comply with any applicable governmental law, rule, regulation, or other requirement; and for products installed in or used in connection with the Work.

3.17 OWNER AS INTENDED BENEFICIARY

The Owner is an intended beneficiary of any architectural or engineering work secured by, or performed by, the Contractor to fulfill its obligations under the Contract. Contractor shall state in its contracts with architectural or engineering consultants that their work is for the intended benefit of the Owner.

3.18 NOTICE OF EXCUSE FOR NONPERFORMANCE

If Contractor believes that acts or omissions of Owner (including but not limited to Owner caused delay) have prevented Contractor from performing the Work as required by the Contract Documents and Contractor intends to rely on Owner's acts or omissions and Civil Code section 1511(1) as reasons to excuse Contractor's nonperformance or to support, among other things, Contractor's requests for time extensions under section 4.5, below, Contractor shall provide written notice of the excuse within five (5) days of the Owner's acts or omissions. If Contractor

fails to timely submit the written notice, Contractor shall have waived any right to later rely on the acts or omissions as a defense to Contractor's nonperformance or as the basis for a time extension, regardless of the merits of the defense or time extension. Contractor will not have satisfied a condition precedent or exhausted administrative remedies. Contractor acknowledges that these written notices are of critical importance to the Owner's management of the Work and Project and the mitigation of costs and delays to the Work and Project.

3.19 RECOVERY OF COSTS, DAMAGES, OR TIME EXTENSIONS FROM OWNER

Notwithstanding any other provisions of the Contract Documents, Contractor expressly waives its right to recover any special, consequential, or indirect damages from Owner in relation to this Contract or the Project. Contractor may only recover general (also known as direct) damages from Owner to the extent allowed by the Contract Documents.

A Notice of Potential Change, Change Order Request and, if necessary, a Claim (see Sections 4.5, 7.2, and 7.6, below) are the exclusive means for Contractor to preserve its rights to recover any costs, damages, or time extensions related to the Contract or the Project from Owner, including but not limited to alleged breaches of contract based on extra work, delay, wrongful withholding, or wrongful termination. Contractor's failure to comply with the Contract Documents' procedures for a COR, CO, and Claim (including but not limited to Sections 4.5, 7.2, 7.6, and 7.7, below) may completely waive Contractor's rights to recovery any such costs or damages.

3.20 USE OF FEDERAL FUNDS

If federal funds are being used either in whole or in part for this Project (see the Instructions to Bidders), then the Project is subject to, and Contractor must comply with, all applicable federal laws including but not limited to the federal regulations set forth in CFR Title 2, Part 200. Accordingly, Contractor agrees to comply with all such federal requirements, including but not limited to the following:

A. **EQUAL EMPLOYMENT OPPORTUNITY.** Contractor agrees to comply with and be bound by Title 14, CFR, Section 60-1.4(b), in accordance with Executive Order 11246, "Equal Employment Opportunity" ([30 FR 12319](#), [12935](#), [3 CFR Part, 1964-1965](#) Comp., p. 339), as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and implementing regulations at [41 CFR part 60](#), "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," the terms of which are incorporated by reference as though set forth in full herein.

B. **DAVIS-BACON ACT.** If the Contract Price exceeds \$2,000, Contractor agrees to comply with and be bound by, and assist Owner in ensuring compliance with, the Davis-Bacon Act, as applicable. (40 U.S.C. §§ 3141-3144; 3146-3148 as supplemented by Department of Labor regulations (29 CFR Part 5, "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction").) Contractor is required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made

by the Secretary of Labor. Additionally, Contractor is required to pay wages not less than once a week. Furthermore, pursuant to the Copeland “Anti-Kickback” Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, “Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States”), Contractor is prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled.

C. **CONTRACT WORK HOURS AND SAFETY STANDARDS ACT.** If the Contract Price exceeds \$100,000 that involve the employment of mechanics or laborers, Contractor agrees to comply with and be bound by, and assist Owner in ensuring compliance with, the Contract Work Hours and Safety Standards Act, as applicable. (40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5).) Under 40 U.S.C. 3702 of the Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

D. **RIGHTS TO INVENTIONS MADE UNDER A CONTRACT AGREEMENT.** For all contracts that meet the definition of “funding agreement” under 37 CFR § 401.2 (a) and the recipient or subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that “funding agreement,” Contractor agrees to comply with and be bound by, and assist Owner in ensuring compliance with, 37 CFR Part 401, “Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements,” the provisions of which are incorporated herein by this reference, and any implementing regulations issued by the awarding agency, as applicable.

E. **CLEAN AIR AND FEDERAL WATER POLLUTION ACT CONTROL.** If the Contract Price exceeds \$150,000, Contractor agrees to comply with and be bound by, and assist Owner in ensuring compliance with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251-1387). Any violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).

F. **DEBARMENT AND SUSPENSION.** Contractor represents and warrants that it is not listed on the government-wide exclusions in the System for Award Management (SAM), and Contractor agrees to comply with and be bound by, and assist Owner in ensuring compliance with, the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (3 CFR part 1986 Comp., p. 189) and 12689 (3 CFR part 1989 Comp., p. 235), “Debarment and Suspension.” SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies,

as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.

G. BYRD ANTI-LOBBYING AMENDMENT. If the Contract Price exceeds \$100,000, Contractor agrees to comply with and be bound by, and assist Owner in ensuring compliance with, the Byrd Anti-Lobbying Amendment (31 U.S.C. § 1352). Contractor shall file the declaration and certification required by 31 U.S.C. § 1352(b).

H. PROCUREMENT OF RECOVERED MATERIALS. Contractor agrees to comply with, and be bound by, and assist Owner in ensuring compliance with, 2 CFR Section 200.323, as applicable.

I. PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT. Contractor agrees to comply with, and be bound by, and assist Owner in ensuring compliance with, 2 CFR Section 200.216, as applicable.

J. DOMESTIC PREFERENCES FOR PROCUREMENT. Contractor agrees to comply with, and be bound by, and assist Owner in ensuring compliance with, 2 CFR Section 200.322, as applicable. 2 CFR Section 200.322 requires Contractor to provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products), to the greatest extent practicable.

K. CONTRACTING WITH SMALL AND MINORITY BUSINESSES, WOMEN'S BUSINESS ENTERPRISES, AND LABOR SURPLUS AREA FIRMS. Contractor agrees to comply with, and be bound by, and assist Owner in ensuring compliance with, 2 CFR Section 200.321, as applicable. 2 CFR Section 200.321 requires Contractor to take the affirmative steps listed in 2 CFR Section 200.321 paragraphs (b)(1) through (5) to assure that minority businesses, women's business enterprises, and labor surplus area firms are used when possible.

L. SAFETY AND HEALTH STANDARDS. As required by 34 CFR 75.609, Contractor agrees to comply with and be bound by, and assist Owner in ensuring compliance with, the standards under the Federal Occupational Safety and Health Act of 1970 (29 U.S.C.A., Section 651 et seq.) and State and local codes to the extent that they are more stringent.

M. ENERGY CONSERVATION. As required by 34 CFR 75.616, Contractor agrees to construct facilities to maximize the efficient use of energy and to comply with and be bound by, and assist OWNER in ensuring compliance with, the following standards of the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) set forth in 34 CFR 75.616. Contractor shall also comply with and be bound by, and assist Owner in ensuring compliance with, the mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plans issued in compliance with the Energy Policy and Conservation Act (Pub. L 94-163, 89 Stat. 871).

N. If any provision is required by federal law, or by the federal grant program funding such project, to be included in the Contract Documents, such provisions shall be deemed by the

parties to have been included.

ARTICLE 4

ADMINISTRATION OF THE CONTRACT

4.1 ARCHITECT

4.1.1 DEFINITION

The Architect is the person lawfully licensed to practice architecture or an entity lawfully practicing architecture identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term “Architect” means the Architect or the Architect’s authorized representative, and shall also refer to all consultants under the Architect’s direction and control.

4.1.2 MODIFICATION

To the extent the Contract Documents indicate that Owner has assigned duties or responsibilities to the Architect, Owner reserves the right at all times to reassign such duties or responsibilities to different Owner representatives.

4.1.3 TERMINATION

In the case of the termination of the Architect, the Owner may appoint an architect or another construction professional or may perform such functions with its own licensed professional personnel. The status of the replacement Architect under the Contract Documents shall be that of the former architect.

4.2 ARCHITECT’S ADMINISTRATION OF THE CONTRACT

4.2.1 STATUS

The Architect will provide administration of the Contract and may be one of several Owner’s representatives during construction, through release of all retention, and during the one (1) year period following the commencement of any warranties. The Architect will advise and consult with the Owner. The Architect will have authority to act on behalf of the Owner only to the extent set forth in the Owner/Architect agreement. The Architect will have all responsibilities and power established by law, including California Code of Regulations, Title 24, to the extent set forth in the Owner/Architect agreement.

4.2.2 SITE VISITS

The Architect will visit the Site at intervals necessary in the judgment of the Architect or as otherwise agreed by the Owner and the Architect in writing 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.

4.2.3 LIMITATIONS OF CONSTRUCTION RESPONSIBILITY

The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract Documents, or by tests, inspections, or approvals required or performed by persons other than the Contractor.

4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

The Owner and the Contractor shall communicate through the Architect, unless there is a construction manager for the Project or the Owner directs otherwise. Communications between Owner and Subcontractors or material or equipment suppliers shall be through the Contractor.

4.2.5 PAYMENT APPLICATIONS

The Contractor shall submit payment applications to the Architect, unless there is a construction manager for the Project or the Owner directs otherwise.

4.2.6 REJECTION OF WORK

The Architect, Inspector of Record, any construction manager and others may recommend to the Owner that the Owner reject Work which does not conform to the Contract Documents or that the Owner require additional inspection or testing of the Work in accordance with paragraph 13.5.5, whether or not the Work is fabricated, installed, or completed. However, no recommendation shall create a duty or responsibility to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons performing portions of the Work.

4.2.7 CHANGE ORDERS

The Architect may prepare change orders and construction change directives and may authorize minor changes in the Work.

4.2.8 WARRANTIES UPON COMPLETION

The Architect in conjunction with the Inspector of Record, or as otherwise directed by Owner, will conduct field reviews of the Work to determine the date of Completion, shall receive and forward to the Owner for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor. The handling by the Architect of such warranties, maintenance manuals, or similar documents shall not diminish or transfer to the Architect any responsibilities or liabilities required by the Contract Documents of the Contractor or other entities, parties, or persons performing or supplying the Work.

Except as may be otherwise directed by Owner, the Architect will conduct a field review of the Contractor's comprehensive list of items to be completed or corrected for development of a punch list and one (1) follow-up field review if required. The cost incurred by the Owner for further field reviews or the preparation of further punch lists by the Architect shall be invoiced to the Contractor and withheld from payment and/or retention.

4.2.9 INTERPRETATION

The Architect, Inspector of Record, any construction manager, the Owner or any independent consultant of Owner, as Owner deems appropriate, will interpret and decide matters concerning performance under and requirements of the Contract Documents on written request of the Contractor. The Owner's response to such requests will be made with reasonable promptness, while allowing sufficient time to permit adequate review and evaluation of the request.

4.2.10 ADDITIONAL INSTRUCTIONS

4.2.10.1 *Architect's Interpretations and Decisions.* 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. When making such interpretations of and decisions regarding the Contract Documents, the Architect will endeavor to secure faithful performance under the Contract Documents by both the Owner and the Contractor and will not show partiality to either. The Work shall be executed in conformity with, and the Contractor shall do no work without, approved drawings, Architect's clarifying instructions, and/or submittals.

4.2.10.2 *Typical Parts and Sections.* Whenever typical parts or sections of the Work are completely detailed on the Drawings, and other parts or sections which are essentially of the same construction are shown in outline only, the complete details shall apply to the Work which is shown in outline.

4.2.10.3 *Dimensions.* Dimensions of Work shall not be determined by scale or rule. Figured dimensions shall be followed at all times. If figured dimensions are lacking on Drawings, Architect shall supply them on request. The Owner's decisions on matters relating to aesthetic effect will be final if consistent with the Contract Documents.

4.3 INSPECTOR OF RECORD

4.3.1 GENERAL

One or more Project inspectors ("Inspector of Record") employed by the Owner and approved by the Division of the State Architect will be assigned to the Work in accordance with the requirements of Title 24 of the California Code of Regulations. The Inspector of Record's duties will be as specifically defined in Title 24.

4.3.2 INSPECTOR OF RECORD'S DUTIES

All Work shall be under the observation of or with the knowledge of the Inspector of Record. The Inspector of Record shall have free access to any or all parts of the Work at any time. The Contractor shall furnish the Inspector of Record such information as may be necessary to keep the Inspector of Record fully informed regarding progress and manner of work and character of materials. Such observations shall not, in any way, relieve the Contractor from responsibility for full compliance with all terms and conditions of the Contract, or be construed to lessen to any degree the Contractor's responsibility for providing efficient and capable superintendence. The Inspector of Record is not authorized to make changes in the drawings or specifications nor shall the Inspector of Record's approval of the Work and methods relieve the Contractor of responsibility for the correction of subsequently discovered defects, or from its obligation to comply with the Contract Documents.

4.3.3 INSPECTOR OF RECORD'S AUTHORITY TO REJECT OR STOP WORK

The Inspector of Record shall have the authority to reject work that does not comply with the provisions of the Contract Documents. In addition, the Inspector of Record may stop any work which poses a probable risk of harm to persons or property. The Contractor shall instruct its employees, Subcontractors, material and equipment suppliers, etc., accordingly. The absence of any Stop Work order or rejection of any portion of the Work shall not relieve the Contractor from any of its obligations pursuant to the Contract Documents.

4.3.4 INSPECTOR OF RECORD'S FACILITIES

Within seven (7) days after notice to proceed, the Contractor shall provide the Inspector of Record with temporary facilities, including any requirements stated in Division 1 of the Specifications.

4.4 RESPONSIBILITY FOR ADDITIONAL CHARGES INCURRED BY THE OWNER FOR PROFESSIONAL SERVICES

If at any time prior to the Completion of the requirements under the Contract Documents, through no fault of its own, the Owner is required to provide or secure additional professional services for any reason by any act or omission of the Contractor, the Contractor shall be invoiced by the Owner for any actual costs incurred for any such additional services, which costs may, among other remedies, be withheld from the progress payments and/or retention. Such invoicing shall be independent from any other Owner remedies, including but not limited to liquidated damages. If payments then or thereafter due to the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. Additional services shall include, but shall not be limited to, the following:

- A. Services made necessary by the default of the Contractor.

- B. Services made necessary due to the defects or deficiencies in the Work of the Contractor.
- C. Services required by failure of the Contractor to perform according to any provision of the Contract Documents.
- D. Services in connection with evaluating substitutions of products, materials, equipment, Subcontractors proposed by the Contractor, and making subsequent revisions to drawings, specifications, and providing other documentation required (except for the situation where the specified item is no longer manufactured or available).
- E. Services for evaluating and processing Claims submitted by the Contractor in connection with the Work outside the established Change Order process.
- F. Services required by the failure of the Contractor to prosecute the Work in a timely manner in compliance within the specified time for Completion.
- G. Services in conjunction with the testing, adjusting, balancing and start-up of equipment other than the normal amount customarily associated for the type of Work involved.
- H. Services in conjunction with more than one (1) re-review of required submittals of shop drawings, product data, and samples.

4.5 NOTICES OF POTENTIAL CHANGE, CHANGE ORDER REQUESTS, AND CLAIMS

If the Contractor identifies the potential for extra work, delay in the critical path schedule, or the need for additional money or time, or if the Contractor requests additional money or time on any grounds (including but not limited to an alleged breach of an implied warranty of the correctness of the plans and specifications [*Souza & McCue Construction Co. v. Superior Court* (1962) 57 Cal.2d 508]), or if the Contractor believes that Owner has failed to pay amounts due or otherwise breached the Contract, or otherwise believes that it is entitled to a modification of the Contract terms and conditions, then Contractor shall follow the procedures in this Section 4.5 and Article 7, otherwise Contractor shall have waived its rights to pursue those issues and any later attempts to recover money or obtain a modification shall be barred. Contractor specifically acknowledges the Owner's and public's interest in, and need to know of, potential changes and disputes as early as possible so Owner can investigate, mitigate and resolve adverse cost and time impacts, if any. It is Contractor's obligation to know and comply with the requirements of the Contract Documents, including but not limited to Section 4.5 and Articles 7 and 8, and Owner has no obligation to notify Contractor of any failure to comply with those requirements.

4.5.1 NOTICE OF POTENTIAL CHANGE

Contractor shall submit a written Notice of Potential Change for extra work, critical path delay, or additional money or time. Contractor shall submit written Notices of Potential Change to Owner within five (5) days of the earlier of (a) Contractor becoming aware of the issue creating a potential change, or (b) the date by which Contractor should have become aware of the issue creating a potential change; unless the issues are, or may soon be, adversely affecting the costs or critical path of the Work, in which case the Contractor must submit the written notice without delay so the Owner may take immediate action to mitigate cost and schedule impacts of the change, if any. The written notice shall explain the nature of the potential change so the Owner may take action to mitigate costs and schedule impacts, if necessary.

When submitting a written Notice of Potential Change based on extra work, Contractor shall not perform the extra work until directed in writing to do so by Owner. When submitting a written Notice of Potential Change for an issue of critical path delay, Contractor shall proactively mitigate the effects of the alleged delay as much as reasonably possible so as to minimize any impact to the schedule, until otherwise directed by Owner. If Contractor intends to rely on Owner's acts or omissions in support of a request for a time extension, then Contractor must also provide the notice set forth in section 3.18, above.

Failure to timely submit a written Notice of Potential Change shall constitute a complete waiver by Contractor of any right to later submit a change order request or pursue a Claim on that issue, or to later pursue any additional money or time extensions in any manner related to that issue, regardless of the merits. Contractor will not have satisfied a condition precedent or exhausted administrative remedies. Contractor acknowledges that these written notices are of critical importance to the Owner's Work and Project management and the mitigation of Work and Project costs and delays.

4.5.2 CHANGE ORDERS REQUESTS

If, after submitting a written Notice of Potential Change pursuant to Section 4.5.1, Contractor continues to believe that it is entitled to additional money or time (including but not limited to grant of a time extension; payment of money or damages arising from work done by, or on behalf of, the Contractor, payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to; or an amount the payment of which is disputed by the Owner) based on an issue, then Contractor shall submit a Change Order Request ("COR"; see Section 7.6.1) to Owner within twenty (20) days of the earlier of (i) Contractor becoming aware of the issue creating a potential change, or (ii) the date by which Contractor should have become aware of the issue creating a potential change. A rejection at any time or a lack of a rejection by Owner of a Notice of Potential Change does not affect the timeline for submitting a COR.

Failure to timely submit a COR related to an issue, or failure to comply with any of the COR requirements in the Contract shall constitute a complete waiver by Contractor of any right to later submit a COR or Claim on that issue, or to later pursue any additional money (or time) in any manner related to that issue, regardless of the merits. Contractor will not have satisfied a condition precedent or exhausted administrative remedies.

The COR shall state the grounds for the additional money or time requested and the amount of money or time requested, and Contractor shall include all information and documentation supporting the COR, including but not limited to calculations and analysis that demonstrate that the requested money or time is allowed by the applicable contract provisions and law. For any money or time other than the money and time specifically requested in the COR, Contractor will have completely waived its rights to recover such additional money or time (Contractor will not have satisfied a condition precedent or exhausted administrative remedies). If the COR requests time, then the COR must identify the number of days of time being requested and must include some critical path schedule analysis to support the number of days requested. Contractor may not reserve its rights, whether in a COR or other document, to submit a COR at a later time or in a manner other than as required by the Contract Documents. Any inclusion of a reservation of rights in a COR shall be grounds for rejection of the COR.

In the event that costs or delay are continuing to accrue at the time that a COR is required to be submitted, Contractor must still timely submit the COR with all available information and documentation supporting the COR as described above, and Contractor shall identify the costs or delay that are continuing. For continuing costs, the COR must include an estimate of when the extra work is expected to conclude and the total costs that will be incurred by the time that the extra work is expected to conclude. For continuing delay, the COR must include a schedule and delay analysis of when Contractor estimates that the delay will cease, what the final time extension request is estimated to be, and an estimate of the total of delay damages, if any, that will be requested. When the continuing cost or delay ends, within ten (10) days Contractor shall submit an updated COR that states the final dollar amount and/or time extension requested and that includes all required information and documentation. Failure to submit such final COR shall act as a waiver as described above.

Contractor shall certify each COR that it submits, including the initial COR and final COR for a continuing cost or delay, using the form set forth in Section 4.5.5.1, except that every reference to "Claim" shall be changed to "COR." If a COR is submitted without certification, a certification can still be submitted within the timelines set forth in the first paragraph of Section 4.5.2. If the COR is not timely certified, Contractor will have completely waived its rights to any money or time for that issue. Contractor will not have satisfied a condition precedent or exhausted administrative remedies. A certification of an initial COR for a continuing cost or delay shall include a statement that "Any estimates in the attached initial COR for a continuing cost or delay are based on true and correct facts and reasonable assumptions, as explained in the initial COR."

The Owner may accept the entire COR, accept part of the COR and reject the remainder, reject the entire COR, or request additional information. If the Owner does not respond within thirty (30) days of submission of the COR by accepting the entire COR, accepting part of the COR and rejecting the remainder, or requesting additional information, the entire COR shall be deemed rejected as of the thirtieth (30th) day. In the case of continuing costs or delay, the 30-day deadline in the previous sentence shall not apply to the initial COR; it will only apply to the final COR (see above). If the Owner requests additional information within thirty (30) days of submission, then the Contractor shall submit the information within fifteen (15) days of the date

of the request and the Owner shall have fifteen (15) days after the receipt of the additional information to accept or reject (in whole or in part) the COR. If the Contractor fails to submit the information within fifteen (15) days, then the COR shall be deemed rejected. If the Owner fails to respond within fifteen (15) days after the submission of additional information, the entire COR shall be deemed rejected as of the fifteenth (15th) day.

4.5.3 DEFINITION OF CLAIM

A “Claim” is a separate demand by the Contractor sent by registered or certified mail, return receipt requested, for (a) a time extension, including, without limitation, a request for relief from damages or penalties for delay assessed by Owner under the Contract Documents; (b) payment by Owner of money or damages arising from work done by, or on behalf of, the Contractor pursuant to the Contract Documents, and payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to (including but not limited to a claim for damages based on misleading or incomplete plans or specifications); or (c) an amount the payment of which is disputed by the Owner. A Claim includes any claim within the scope of Public Contract Code sections 9204 or 20104 et seq., and any alleged violation of a prompt payment statute. Resubmission in any manner of a COR which was previously rejected under Section 4.5.2 constitutes a Claim, whether the COR was rejected in whole or in part, and whether the COR was rejected expressly or deemed rejected by Owner inaction. A Claim includes any dispute Contractor may have with the Owner, including one which does not require a Notice of Potential Change or COR under Sections 4.5.1 and 4.5.2, and including any alleged breach of contract by the Owner (such as wrongful withholding of a payment by the Owner). A Claim under this Article 4.5 shall also constitute a claim for purposes of the California False Claims Act. In the event of a conflict between a Claims provision in Division 1 of the Specifications and Section 4.5, Section 4.5 shall take precedence.

The Notice of Potential Change and COR procedures above are less formal procedures which precede the more formal Claim. A Notice of Potential Change does not constitute a Claim. A COR does not constitute a Claim; **except that** if insufficient time remains before the Claim deadline (see Article 4.5.4) for Contractor to submit a COR and for Owner to process and reject the COR under Article 4.5.2, then either (1) Contractor may submit a COR which Owner shall treat as a Claim, but only if the COR complies with all requirements in this Article 4.5 and Article 7 for COR’s and Claims, or (2) a COR is not required so long as a Claim complying with this Article 4.5 is timely submitted.

A Claim does not include vouchers, invoices, progress payment applications, or other routine or authorized forms of requests for progress payments on the Contract; however, those documents remain “claims” for purposes of the California False Claims Act. A Claim does not include a Government Code Claim. (“Government Code Claim” means a claim under Government Code sections 900 et seq. and 910 et seq.)

4.5.4 TIME FOR SUBMITTING CLAIM; WAIVER

Contractor shall submit a Claim to the Owner’s construction manager (or in the absence of a construction manager, to Architect) and Owner within the earlier of (a) fifteen (15) days after

Owner's rejection of a COR in whole or in part, or (b) fifteen (15) days after a COR being deemed rejected, pursuant to Section 4.5.2 above. If the Claim is not based on an issue for which a COR would be required (such as wrongful withholding by the Owner), then Contractor shall submit the Claim within fifteen (15) days after the date on which Contractor knew, or should have known, about the issue on which the Claim is based. If a Claim has not been submitted as of the date that the Contractor Completes the Work and submittal of the Claim was not yet required under the Contract Documents, then the Claim shall be submitted within seven (7) days of Completion of the Work; and such Claim shall not be barred due to lack of a Notice of Potential Change or COR if the deadline for the Notice of Potential Change or COR was after Completion of the Work.

In addition, within seven (7) days of Completion of the Work, Contractor shall submit to Owner, in writing, a list and summary of all Claims for money or time extensions under or arising out of this Contract which were timely filed, which were fully compliant with the Contract's requirements for Claims, and which the Contractor wishes to pursue in whole or in part. This Claim summary requirement shall not extend the time for submitting a Claim.

Failure to timely submit a Claim or Claim summary, failure to specifically identify a Claim in the Claim summary, or failure to comply with any of the requirements in the Contract for a Claim, including but not limited to this Article 4, will act as a complete waiver of Contractor's rights to (a) recover money or time on the issues for which a Claim was required, (b) submit a Government Code Claim for the money or time (see Section 4.5.6.4), and (c) initiate any action, proceeding or litigation for the money or time, regardless of the merits; Contractor will not have satisfied a condition precedent or exhausted administrative remedies. Owner does not have an obligation to reject the Claim for a failure to comply with any of the Claim requirements in the Contract, including the lack of certification, and any failure by Owner to reject, or any delay in rejecting, a Claim on that basis does not waive the Owner's right to reject the Claim on that basis at a later time. In no event may the Contractor reserve its rights to assert a Claim for a time extension or additional money beyond the timelines set forth in this provision unless the Owner agrees in writing to allow the reservation.

4.5.5 CONTENT OF CLAIM

4.5.5.1 *Claim Format; Waiver*

Every Claim shall be in writing. All money or time extensions sought must be stated and itemized in the Claim at the time submitted. The responsibility to substantiate Claims shall rest with the Contractor, and the Contractor shall furnish reasonable documentation to support each Claim, including as applicable, that documentation set forth in sections 4.5.5.2 through 4.5.5.4.

In addition, the Contractor shall include a certification with each and every Claim at the time of submission, as follows:

I, _____ [name of declarant], declare the following:

_____ [Contractor company name] has entered into a Contract with _____ [public entity name] on the _____ [name of project] Project. _____ [Contractor company name] authorized me to prepare the attached Claim for money and/or time extension) for _____ [public entity name] regarding _____ [Contractor company's name] Work on the Contract, and requesting \$ _____ and/or _____ additional days), and I prepared the attached Claim. I am the most knowledgeable person at _____ [Contractor company name] regarding this Claim.

The attached Claim complies with all laws applicable to submission of a Claim, including but not limited to California Penal Code section 72, Government Code sections 12650 et seq. (False Claims Act), and Business and Professions Code sections 17200 et seq. (Unfair Business Practices Act). I am aware that submission or certification of false claims, or other claims that violate law or the Contract, may lead to fines, imprisonment, and/or other serious legal consequences for myself or _____ [Contractor company name].

The attached Claim does not breach the Contract between _____ [Contractor company name] and _____ [public entity name] for this Project, is not a false claim, does not violate any applicable law, satisfies all provisions of the Contract applicable to submission of the Claim, only contains truthful and accurate supporting data, and only requests money and/or time extensions that accurately reflect the adjustments to money and time for which I believe that _____ [public entity name] is responsible under its Contract with _____ [Contractor company name].

While preparing this declaration and Claim, I consulted with others (including attorneys, consultants, or others who work for _____ [Contractor company name]) when necessary to ensure that the statements were true and correct.

Contractor understands and agrees that any Claim submitted without this certification does not meet the terms of the Contract Documents; that Owner, or Owner's representatives, may reject the Claim on that basis; and that unless Contractor properly and timely files the Claim with the certification, Contractor cannot further pursue the Claim in any forum and all rights to additional money or time for the issues covered by the Claim are waived due to a condition precedent not having been satisfied.

I declare under the penalty of perjury under the laws of the State of California that the foregoing is true and correct. Executed _____, 20__, at _____, California.

_____ [name of declarant]

Contractor's failure to timely submit a certification will constitute a complete waiver of Contractor's rights to (a) recover money or time on the issues for which a Claim was required, (b) submit a Government Code Claim (see Section 4.5.6.3) for the money or time, and (c) initiate any action, proceeding or litigation for the money or time. Contractor will not have satisfied a condition precedent or exhausted administrative remedies.

4.5.5.2 Claims for Additional Money

Each Claim for additional money (including but not limited to those described in (b) and (c) of the first paragraph of Section 4.5.3) must include all facts supporting the Claim, including but not limited to all supporting documentation plus a written analysis as to (a) why the claimed cost was incurred, (b) why Contractor could not mitigate its costs, (c) why the claimed cost is the responsibility of the Owner, and (d) why the claimed cost is a reasonable amount. In no event will the Contractor be allowed to reserve its rights, whether in a Claim or other document, to assert a Claim for money at a later time or in a manner other than as required by the Contract Documents. Any inclusion of a reservation of rights in a Claim shall be grounds for rejection of the Claim. Any costs not asserted shall be waived. A Claim may not include any costs incurred in preparation of the Claim or in preparation of any underlying COR, including but not limited to costs of delay analysis.

4.5.5.3 Claims for Additional Time

4.5.5.3.1 Notice of Extent of Claim

If the Contractor wishes to make a Claim for an increase in the Contract Time (including but not limited to Section 4.5.3(a)), the Claim shall include, but not be limited to, all facts supporting the Claim, all documentation of such facts, all information required by the Contract Documents, all information establishing entitlement to a time extension pursuant to Section 8.4.1 below, a current and certified schedule (see Section 3.9.1, above), and a delay analysis explaining (a) the nature of the delay, (b) the Owner's responsibility for the claimed delay, (c) the claimed delay's impact on the critical path, (d) the claimed delay's impact on the date of Completion (including an analysis of any float still remaining and whether the alleged delay in work exceeds such remaining float), and (e) why Contractor could not mitigate the delay impacts. Failure to include an updated and certified schedule, or a delay analysis, in a Claim seeking a time extension will act as a complete waiver of Contractor's rights to (i) recover money or time based on the issues addressed by the Claim, (ii) submit a Government Code Claim for the requested money or time (see Section 4.5.6.4), and (iii) initiate any action, proceeding or litigation for the requested money or time, regardless of the merits; Contractor will not have satisfied a condition precedent or exhausted administrative remedies.

In no event will the Contractor be allowed to reserve its rights, whether in a Claim or other document, to assert a Claim for a time extension at a later time or in a manner other than as required by the Contract Documents. Any inclusion of a reservation of rights in a Claim shall be grounds for rejection of the Claim. Any time extension not timely asserted in a certified Claim shall be waived.

4.5.5.3.2 *Unusual and Uncommon Weather Claims*

If unusual and uncommon weather is the basis for a Claim for additional time, Contractor's delay analysis (see Section 4.5.5.3.1, above) must also provide Owner data and facts showing that the weather conditions were unusual and uncommon for the period of time, could not have been reasonably anticipated or mitigated, had an adverse effect on the critical path of the scheduled construction, and meet all other Contract requirements for a time extension (including but not limited to Section 8.4.1, below).

4.5.5.4 *Subcontractor Requests for Money or Time*

A Subcontractor or supplier to Contractor may not submit a request for additional time or money directly to the Owner due to its lack of contractual privity with Owner. If a Subcontractor or supplier submits to Contractor a request for additional money or time based on an alleged breach of the subcontract or supplier contract by Contractor, Contractor may elect to seek money or time from Owner based on that request of the Subcontractor or supplier.

For any such request to Owner by Contractor, Contractor must comply with the requirements and prerequisites in the Contract Documents for requests to the Owner for money or time (including but not limited to Section 4.5 of the General Conditions regarding Notices of Potential Change, Change Order Requests ["CORs"], Claims, and certifications) and with Public Contract Code section 9204(d)(5). Any such COR or Claim by Contractor must include Contractor's certification (see General Conditions §§4.5.2 and 4.5.5.1), a complete copy of the Subcontractor's or supplier's request for money or time (including all documents submitted by the Subcontractor or supplier), and any other necessary supporting documentation. Any such COR or Claim by Contractor must also include (a) Contractor's detailed analysis of the merit of Subcontractor's or supplier's request to the Contractor, including (i) analysis of Contractor's alleged breaches of the subcontract or supplier contract that allegedly caused the Subcontractor or supplier to incur damages or delay, and (ii) analysis of all of Contractor's defenses to the request for money or time by the Subcontractor or supplier; and (b) Contractor's detailed analysis of the Owner's liability to Contractor for any money or time that Contractor owes, or may later be determined to owe, to Subcontractor or supplier (including but not limited to how Owner's alleged breaches of the Contract Documents caused Contractor to breach the subcontract or supplier contract). In any such COR or Claim, Contractor may deny that it is liable to the Subcontractor or supplier for some or all of the requested money or time, or it may assert that it is merely submitting the COR or Claim to Owner on behalf of the Subcontractor or supplier; but doing one or the other would not excuse Contractor from complying with the above requirements for its request to the Owner.

Any failure by Contractor to timely comply with this Section 4.5.5.4 (including a failure to timely submit a Notice of Potential Change, COR, Claim, certifications, or detailed analysis) shall act as a complete waiver of Contractor's rights to (a) recover money or time from Owner based on any money or time that Contractor owes, or may later be determined to owe, to the Subcontractor or supplier, (b) submit a Government Code Claim to Owner for the money or time requested by the Subcontractor or supplier (see Section 4.5.6.3), and (c) initiate any action, proceeding or litigation against Owner for any money or time that Contractor owes, or may later

be determined to owe, to the Subcontractor or supplier. Contractor will not have satisfied a condition precedent or exhausted administrative remedies.

4.5.6 PROCEDURES FOR CLAIMS (PUBLIC CONTRACT CODE SECTION 9204)

Claims are subject to this section 4.5.6, and Public Contract Code section 9204, as well as the separate procedures and substantive provisions of Sections 4.5.1 through 4.5.5 and the rest of the Contract Documents. Claims of \$375,000 or less, are also subject to Public Contract Code sections 20104 et seq., but to the extent that one of the procedures in Sections 20104 et seq. conflicts with the procedures in Section 9204, the requirements of Section 9204 shall control.

4.5.6.1 *Claims*

The Owner shall conduct a reasonable review of the Claim and shall respond in writing to any written Claim within 45 days of receipt of the Claim. During that 45-day period, plus any extension, Owner may request in writing additional documentation supporting the Claim or relating to defenses to the Claim the Owner may have against the Contractor. Owner shall review any additional documentation Contractor supplies in response to that request within the 45 day, plus any extension, timeline.

After receipt of a Claim, the 45-day period may be extended by Owner and Contractor. The written response shall identify which portion of the Claim is disputed and what portion is undisputed. If Owner needs approval from its governing board to provide the written response, and the governing board does not meet within the 45 days or any extended period of time, then the Owner shall have up to three days after the next publicly noticed meeting of the governing board to provide the written response. Any payment due on an undisputed portion of the Claim shall be processed and made within sixty (60) days after the Owner issues the written response. Owner's failure to respond to a Claim within the above time periods or to otherwise meet the above time requirements shall result in the Claim being deemed rejected in its entirety.

4.5.6.2 *Meet and Confer*

If the Contractor disputes the Owner's written response, or the Owner fails to respond within the time prescribed, the Contractor may so notify the Owner, in writing, either within 15 days of receipt of the Owner's response or within 15 days of the Owner's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a written demand sent by registered or certified mail return receipt requested, the Owner shall schedule a meet and confer conference for settlement of the dispute, which shall take place within 30 days of the demand. Upon written agreement of the Owner and Contractor, the conference may take place during regularly scheduled Project meetings. The informal conference is not a mediation since there is no neutral person facilitating communication to assist the parties to reach agreement; therefore, the provisions of Evidence Code sections 1115-1128 shall not apply to any portion of the informal conference (including but not limited to any documents provided or shown, or statements of fact or opinion made, by a party) unless the parties expressly agree in writing to their application. Any offer of compromise at an informal conference shall not be admissible to prove liability, as provided in Evidence

Code section 1152, but this statute's prohibition of admissibility shall not apply to other statements before or at the informal conference, or in any document prepared for or exchanged at the informal conference.

If Contractor fails to timely notify the Owner that it wishes to meet and confer pursuant to the previous paragraph, then Contractor will have waived all rights to (a) recover money or time on the issues for which a Claim was required, (b) submit a Government Code Claim (see Section 4.5.6) for such money or time, and (c) initiate any action, proceeding or litigation for such money or time. Contractor will not have satisfied a condition precedent or exhausted administrative remedies.

Within ten (10) business days after the conclusion of the meet and confer conference, the Owner shall give a written statement to the Contractor identifying the portion of the Claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the Claim shall be processed and made within sixty (60) days after the Owner issues the written statement. Within ten (10) business days of issuance of Owner's written statement, Contractor shall identify in writing the disputed portion of the Claim that shall be submitted to non-binding mediation (which may consist of any nonbinding process, including but not limited to neutral evaluation or a dispute review board), with the Owner and Contractor sharing the costs equally. The Owner and Contractor shall mutually agree to a mediator within ten (10) business days after the Contractor has identified in writing the disputed portion of the Claim. If they cannot agree upon a mediator, then each shall select a mediator and those two mediators shall select a qualified neutral third party to mediate the disputed portion of the Claim. (Each party shall bear the fees and costs its respective mediator charged in connection with the selection of the neutral mediator). The parties may mutually waive in writing the requirement for mediation. If Contractor fails to timely notify the Owner in writing that it wishes to mediate pursuant to this paragraph, Contractor will have waived all right to further pursue the Claim pursuant to section 4.5.4. The parties shall reasonably cooperate to schedule and attend a mediation as soon as reasonably possible. Owner's failure to respond to the Claim within the above time periods or to otherwise meet the above time requirements shall result in the Claim being deemed rejected in its entirety.

4.5.6.3 *Government Code Claim*

If the Claim or any portion remains in dispute after the mediation and Contractor wishes to pursue it, the Contractor **must** file a timely and proper Government Code Claim. The filing of a Government Code Claim is specifically required in addition to all contractual procedures described in Sections 4.5 through 4.5.6.2. The above contractual procedures do not act as a substitute for the Government Code Claim process, and the two sets of procedures shall be sequential with the contractual procedures coming first.

Failure to timely file a Government Code Claim shall act as complete waiver of Contractor's rights to (a) recover money or time on the issues for which a Government Code Claim was required, and (b) initiate any action, proceeding or litigation for such money or time. Contractor will not have satisfied a condition precedent or exhausted administrative remedies.

Owner and Contractor shall proceed with the Government Code Claim according to Government Code, Section 900 et seq., and as otherwise permitted by law. For purposes of the applicable Government Code provisions, and as provided in Public Contract Code section 20104.2(e), the running of the time period within which a Contractor must file a Government Code Claim shall be tolled from the time the Contractor submits a written Claim under Article 4.5 until the time that the Claim is denied, in whole or in part, as a result of the meet and confer process in Section 4.5.6.2, including any period of time utilized by the meet and confer process.

4.5.7 CONTINUING CONTRACT PERFORMANCE

Despite Contractor's submission of, or Owner's rejection of, a Notice of Potential Change, COR or Claim, or Government Code Claim based on alleged breaches of the Contract by Owner, the Contractor shall proceed diligently with performance of the Contract as directed by Owner, and the Owner shall continue to make any undisputed payments in accordance with the Contract. Contractor acknowledges that Completion of the Work is a high priority for both Owner and Contractor as failure to Complete the Work would most likely cause each of them to incur much greater costs and damages than would be incurred if the Work were Completed. If Contractor believes that Owner has breached the Contract and that such breach is preventing or delaying Contractor's performance as directed by Owner, then Contractor must submit notice as required by Section 3.18, above.

4.5.8 CLAIMS FOR CONCEALED OR UNKNOWN CONDITIONS

4.5.8.1 Trenches or Excavations Less Than Four Feet Below the Surface

If Contractor encounters conditions at the Site which are subsurface or otherwise concealed physical conditions, which differ materially from those indicated in the Contract Documents, or unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall give notice to the Owner promptly before conditions are disturbed and in no event later than ten (10) days after first observance of the conditions. If Contractor believes that such conditions differ materially and will cause an increase in the Contractor's cost of, time required for, or performance of any part of the Work, Contractor must comply with the provisions above for Notice of Potential Change, Change Order Request, and Claims (beginning with Section 4.5.1).

4.5.8.2 Trenches or Excavations Greater Than Four Feet Below the Surface

Pursuant to Public Contract Code section 7104, when any excavation or trenching extends greater than four feet below the surface:

4.5.8.2.1 The Contractor shall promptly, and before the following conditions are disturbed, notify the public entity, in writing, of any:

(1) Material that the Contractor believes may be material that is hazardous waste, as defined in Section 25117 of the Health and Safety Code, that

is required to be removed to a Class I, Class II, or Class III disposal site in accordance with the provisions of existing law.

(2) Subsurface or latent physical conditions at the site differing from those indicated by information about the site made available to bidders prior to the deadline for submitting bids.

(3) Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract.

4.5.8.2.2 The public entity shall promptly investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the Work shall issue a change order under the procedures described in the Contract.

4.5.8.2.3 In the event that a dispute arises between the public entity and the Contractor whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the Contractor's cost of, or time required for, performance of any part of the Work, the Contractor shall not be excused from the Contract Completion deadline, but shall proceed with all Work to be performed under the Contract. The Contractor shall retain any and all rights provided either by Contract or by law which pertain to the resolution of disputes and protests between the contracting parties.

4.5.9 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, any of the other party's employees or agents, or others for whose acts such party is legally liable, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding ten (10) days after first observance. The notice shall provide sufficient detail to enable the other party to investigate the matter. For a Notice of Potential Change, COR and Claim for additional cost or time related to this injury or damage, Contractor shall follow Section 4.5.

ARTICLE 5

SUBCONTRACTORS

5.1 DEFINITIONS

5.1.1 SUBCONTRACTOR

A Subcontractor is a person or entity, who has a contract with the Contractor to perform a portion of the Work at the Site. The term "Subcontractor" is referred to throughout the Contract

Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term “Subcontractor” does not include a separate contractor or subcontractors of a separate contractor. To the extent that the term Trade Contractor is utilized in the Contract Documents, it shall have the same meaning as the term “Subcontractor.”

5.1.2 SUB-SUBCONTRACTOR

A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the Site. The term “Sub-subcontractor” is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

5.1.3 SPECIALTY CONTRACTORS

If a Subcontractor is designated as a “Specialty Contractor” as defined in section 7058 of the Business and Professions Code, all of the Work outside of that Subcontractor’s specialty shall be performed in compliance with the Subletting and Subcontracting Fair Practices Act, Public Contract Code sections 4100, et seq.

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

5.2.1 ASSIGNMENT OR SUBSTITUTION - CONSENT OF OWNER

In accordance with Public Contract Code sections 4107 and 4107.5, no Contractor whose bid is accepted shall, without the written consent of the Owner: substitute any person or entity as a Subcontractor in place of the Subcontractor designated in the original bid; permit any such Subcontract to be assigned or transferred, or allow it to be performed by any person or entity other than the original Subcontractor listed in the original bid; sublet or subcontract any portion of the Work in excess of one-half of one percent (0.5%) of the Contractor’s total bid as to which its original bid did not designate a Subcontractor. Any assignment or substitution made without the prior written consent of the awarding authority shall be void, and the assignees shall acquire no rights in the Contract. Any consent, if given, shall not relieve Contractor or its Subcontractors from their obligations under the terms of the Contract Documents.

5.2.2 GROUNDS FOR SUBSTITUTION

Pursuant to Public Contract Code section 4107 and the procedure set forth therein, no Contractor whose bid is accepted may request to substitute any person or entity as a Subcontractor in place of a Subcontractor listed in the original bid except in the following instances:

- A. When the Subcontractor listed in the bid after having a reasonable opportunity to do so, fails or refuses to execute a written contract for the scope of work specified in the subcontractor’s bid and at the price specified in the subcontractor’s bid, when that written contract, based upon the general terms, conditions, plans and

specifications for the Project involved or the terms of that Subcontractor's written bid, is presented to the Subcontractor by the Contractor;

- B. When the listed Subcontractor becomes insolvent or the subject of an order for relief in bankruptcy;
- C. When the listed Subcontractor fails or refuses to perform his or her Subcontract;
- D. When the listed Subcontractor fails or refuses to meet the bond requirements of the prime contractor set forth in Public Contract Code section 4108.
- E. When the Contractor demonstrates to the awarding authority, or its duly authorized officer, subject to the further provisions of Public Contract Code section 4107.5, that the name of the Subcontractor was listed as the result of inadvertent clerical error;
- F. When the listed Subcontractor is not licensed pursuant to the Contractors License Law; or
- G. When the awarding authority, or its duly authorized officer, determines that the Work being performed by the listed Subcontractor is substantially unsatisfactory and not in substantial accordance with the plans and specifications, or the Subcontractor is substantially delaying or disrupting the progress of the Work.
- H. When the listed Subcontractor is ineligible to work on a public works project pursuant to Section 1777.1 of the Labor Code.
- I. When the awarding authority determines that a listed Subcontractor is not a responsible contractor.

5.2.2.1 **No Change in Contract.** Any substitutions of Subcontractors shall not result in any increase in the Contract Sum or result in the granting of any extension of time for Completion of the Work.

5.2.2.2 **Substitution Due to Clerical Error.** The Contractor, as a condition of asserting a claim of inadvertent clerical error in the listing of a Subcontractor, shall, pursuant to Public Contract Code section 4107.5, within two (2) working days after the time of the prime bid opening by the awarding authority, give written notice to the awarding authority and copies of such notice to both the Subcontractor it claims to have listed in error, and the intended Subcontractor who had bid to the Contractor prior to bid opening. Any listed Subcontractor who has been notified by the Contractor in accordance with the provisions of this section as to an inadvertent clerical error, shall be allowed six (6) working days from the time of the prime bid opening within which to submit to the awarding authority and to the Contractor written objection to the Contractor's claim of inadvertent clerical error.

In all other cases, the Contractor must make a request in writing to the awarding authority for the substitution of a subcontractor, giving reasons therefor. The awarding authority shall mail a written notice to the listed Subcontractor giving reasons for the proposed substitution. The listed Subcontractor shall have five (5) working days from the date of such notice within which to file with the awarding authority written objections to the substitution.

Failure to file written objections pursuant to the provisions of this section within the times specified herein shall constitute a complete waiver of objection to the substitution by the listed Subcontractor and, where the ground for substitution is an inadvertent clerical error, an agreement by the listed Subcontractor that an inadvertent clerical error was made.

If written objections are filed, the awarding authority shall give five (5) days notice to the Contractor and to the listed Subcontractor of a hearing by the awarding authority on the Contractor's request for substitution as provided in Public Contract Code section 4107. The determination by the awarding authority shall be final.

5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all obligations and responsibilities, which the Contractor, by the Contract Documents, assumes toward the Owner. Each subcontract agreement shall preserve and protect the rights of the Owner under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound. Upon written request of the Subcontractor, the Contractor shall identify to the Subcontractor the terms and conditions of the proposed subcontract agreement, which may be at variance with the Contract Documents. Subcontractors shall similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner provided that:

- A. Assignment is effective only after termination of the Contract with the Contractor by the Owner for cause pursuant to Article 14 and only for those subcontract agreements which the Owner accepts by notifying the Subcontractor in writing; and

- B. Assignment is subject to the prior rights of the surety, if any, obligated under any bond relating to the Contract.

5.5 SUBCONTRACTOR'S RESPONSIBILITIES

Every Subcontractor is bound to the following provisions, unless specifically noted to the contrary in the Subcontractor's contract subject to the limitations of section 5.3.

5.5.1 SUPERVISION BY SUBCONTRACTORS

Subcontractors shall efficiently supervise their Work, using their best skill and attention. Each of them shall carefully study and compare all Drawings, Specifications, and other instructions, shall at once report to Contractor any error or omission which any of them may discover, and shall subsequently proceed with the Work in accordance with instructions from the Contractor concerning such error or omission. Each Subcontractor shall be fully responsible for and shall bear the full risk of loss of all of its property.

5.5.2 DISCIPLINE AND ORDER

Each Subcontractor shall at all times enforce strict discipline and good order among its Subcontractors, material or equipment suppliers, or their agents, employees, and invitees, and shall establish and maintain surveillance over the activities of each of the foregoing to minimize any disturbance, damage, pollution, or unsightly conditions relative to property areas adjacent to or in the vicinity of the Site. The Contractor shall have the right to remove from the Work any employee of a Subcontractor for any reason including, without limitation, incompetence or carelessness.

5.5.3 DEFECTS DISCOVERED

Should the proper and accurate performance of the Work depend upon the proper and accurate performance of other work not included in its Contract, each Subcontractor shall use all necessary means to discover any defect in such other work and shall allow the Contractor, the Owner and Architect, or other Subcontractors as Contractor elects, a reasonable amount of time to remedy such defects. If the Subcontractor should proceed with its Work, it shall be considered to have accepted such other work, unless the Subcontractor shall have proceeded pursuant to instructions in writing by the Contractor over its written objection.

5.5.4 SUBCONTRACTOR INFORMATION

Each Subcontractor shall submit to the Owner, the Contractor, or the Architect, as the case may be, promptly when requested by any of the foregoing, information with respect to the names, responsibilities, and titles of the principal members of its staff, the adequacy of the Subcontractor's equipment and the availability of necessary materials and supplies. Subcontractor shall fully cooperate with Contractor in its periodic review of the adequacy of Subcontractor's supervision, personnel, and equipment, and the availability of necessary materials and supplies and shall promptly comply with the requirements of the Contractor with

respect thereto.

5.5.5 TEMPORARY STRUCTURES

Each Subcontractor shall furnish at its expense its own temporary facilities and storage except those specifically agreed to be furnished to it by the Contractor in the Subcontract Agreement. Subcontractor's material storage rooms and field offices, etc., will be placed in locations designated by the Contractor. When it becomes necessary due to the progress of the Work for the Subcontractor to relocate its field operations, it will do so in an expeditious manner and at no additional cost to Contractor or Owner. The construction of material storage rooms and field offices, etc., will be of fire resistive material only, such as concrete or gypsum block, rated drywall, or sheet metal.

5.5.6 CHARGES TO SUBCONTRACTOR

Each Subcontractor may be subject to the Contractor's reasonable charges for hoisting, repair to other work caused by the fault or negligence of Subcontractor, removal of Subcontractor's rubbish, and clean-up occasioned by Subcontractor.

5.5.7 FINES IMPOSED

Subcontractor shall comply with and pay any fines or penalties imposed for violation of any applicable law, ordinance, rule, regulation, Environmental Impact Report mitigation requirement, and lawful order of any public authority, including, without limitation, all OSHA and California OSHA requirements and those of other authorities having jurisdiction of the safety of persons or property.

5.5.8 PROJECT SIGNS

Each Subcontractor shall not display on or about the Project any sign, trademark, or other advertisement. The Owner will permit a single Project sign, which shall be subject to the Owner's prior and sole discretion and approval, as to all matters including, without limitation, size, location, material, colors, style and size of printing, logos and trademarks (if any), text, and selection of names to be displayed.

5.5.9 REMEDIES FOR FAILURE TO PERFORM

Without limitation of any other right or remedy available to Contractor under the Contract Documents or at law, should: the Subcontractor fail to perform its portion of the Work in a skilled and expeditious manner in accordance with the terms of the Contract Documents with sufficient labor, materials, equipment, and facilities; delays the progress of the job or otherwise fail in any of its obligations; or either a receiver is appointed for the Subcontractor or the Subcontractor is declared to be bankrupt or insolvent, and such appointment, bankruptcy, or insolvency proceedings or declaration is not set aside within thirty (30) days, then the Contractor, upon three (3) days notice to the Subcontractor (subject to the requirements of Pub. Contracts Code, § 4107), may provide such labor, materials, or perform such work and recover the cost

plus profit and overhead from monies due or to become due thereafter to the Subcontractor. The Contractor may terminate the employment of the Subcontractor, taking possession of its tools, materials, and equipment related to the Work and cause the entire portion of the Subcontractor's Work to be finished either by another Subcontractor or through the Contractor's own forces.

5.5.10 DISPUTES NOT TO AFFECT WORK

In the event of any dispute as to whether or not any portion of the Work is within the scope of the Work to be performed by a Subcontractor, or any dispute as to whether or not the Subcontractor is entitled to a Change Order for any Work requested of it or entitled to payment, the Subcontractor shall continue to proceed diligently with the performance of the Work. Regardless of the size or nature of the dispute, the Subcontractor shall not under any circumstances cease or delay performance of its portion of the Work during the existence of the dispute. The Contractor shall continue to pay the undisputed amounts called for under the Subcontract Agreement during the existence of the dispute. Any party stopping or delaying the progress of the Work because of a dispute shall be responsible in damages to the Owner, the Architect, and the Contractor for any losses suffered as a result of the delay.

5.5.11 APPLICATION FOR PAYMENT

Contractor agrees to advise the Subcontractor if any documentation in connection with the Subcontractor's application for payment has not been accepted or is in any way unsatisfactory.

5.5.12 COMPLIANCE WITH PROCEDURES

Each Subcontractor shall comply with all procedures established by the Contractor for coordination among the Owner, the Owner's consultants, Architect, Contractor, and the various Subcontractors for coordination of the Work with all local municipal authorities, government agencies, utility companies, and any other agencies with jurisdiction over all or any portion of the Work. The Subcontractor shall cooperate fully with all of the foregoing parties and authorities.

5.5.13 ON-SITE RECORD KEEPING

Subcontractor shall comply with all on-Site record keeping systems established by the Contractor and shall, upon the request of the Contractor, provide the Contractor with such information and reports as the Contractor may deem appropriate. Without limitation of the foregoing, the Subcontractor shall assemble all required permits and certificates so that they are readily accessible at the Site.

5.5.14 NON-EXCLUSIVE OBLIGATIONS

The specific requirements of Article 5 are not intended to exclude the obligation of the Subcontractor to comply with any of the other provisions of the General Conditions and the other

Contract Documents which are relevant to the proper performance of its portion of the Work.

ARTICLE 6

CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

6.1.1 OWNER'S RIGHTS

The Owner reserves the right to perform Project work with the Owner's own forces, or to award separate contracts in connection with such other work or other construction or operations on the Site under contract conditions identical or substantially similar to these including those portions related to insurance. Upon the election to perform such work with its own forces or by separate contracts, the Owner shall notify the Contractor. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall proceed pursuant to Section 4.5 in the Contract Documents.

6.1.2 DESIGNATION AS CONTRACTOR

When separate contracts are awarded for different portions of the Project or other construction or operations on the Site, the term "Contractor" in the Contract Documents in each of those contracts shall mean the contractor who executes each separate Owner/Contractor agreement.

6.1.3 CONTRACTOR DUTIES

Although the Owner shall have overall responsibility for coordination and scheduling of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, Contractor shall cooperate with Owner. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules when directed to do so. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor until subsequently revised.

6.1.4 OWNER OBLIGATIONS

Unless otherwise provided in the Contract Documents, when the Owner performs work related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations, and to have the same rights, which apply to the Contractor under the General Conditions, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10 and 12.

6.2 MUTUAL RESPONSIBILITY

6.2.1 DELIVERY AND STORAGE

The Contractor shall afford the Owner and separate contractors reasonable opportunity for delivery and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the separate contractors' construction and operations with theirs as required by the Contract Documents.

6.2.2 NOTICE BY CONTRACTOR

If part of the Contractor's Work depends upon proper execution or results from work by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Owner patent 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 Owner'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 reasonably discoverable.

6.2.3 COSTS INCURRED

Costs, expenses, and damages caused by delays, improperly timed activities, defective construction, or damages to another's work/Work or property shall be borne by the party responsible. Should Contractor cause damage to the work or property of any other contractor on the Project, or to the Project or property of a third party, or cause any delay to any such contractor or third party, the Contractor shall defend, indemnify and hold Owner harmless for such damage or delay under Section 3.16, above. Owner may withhold from progress payments and/or retention the cost of delay or damage to another contractor's work or damage to another contractor's property or to the property of Owner caused by Contractor.

6.2.4 CORRECTION OF DAMAGE

The Contractor shall promptly remedy damage wrongfully caused by the Contractor to completed or partially completed construction or to property of the Owner or separate contractors.

6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish as described in Section 3.13, the Owner may clean up and allocate the cost among those responsible as the Owner determines to be just.

ARTICLE 7

CHANGES IN THE WORK

7.1 CHANGES

7.1.1 NO CHANGES WITHOUT AUTHORIZATION

The Owner reserves the right to change the Work by making such alterations, deviations, additions to, or deletions from the plans and specifications, as may be deemed by the Owner to be necessary or advisable for the proper Completion or construction of the Work contemplated, and Owner reserves the right to require Contractor to perform such work. No adjustment will be made in the Contract unit price of any Contract item regardless of the quantity ultimately required.

Owner shall compensate Contractor with money or grant extra time for any extra work ordered by the Owner to be performed. Contractor shall follow the provisions of the Contract Documents, including General Conditions sections 4.5, 7.6, 7.7, and 8.4, when requesting additional money or additional time. Contractor shall expeditiously perform all extra work upon direction, even if no agreement has been reached on extra time or money. For all such changes resulting in a credit to Owner, Contractor shall follow Sections 7.5 and 7.7 in providing the credit to Owner. Contractor shall bring all potential credits to the Owner's attention.

There shall be no change whatsoever in the drawings, specifications, or in the Work or payments under the Contract Documents without an executed Change Order, Construction Change Directive, or order by the Owner pursuant to Section 7.1.2. Owner shall not be liable for the cost of any extra work or any substitutions, changes, additions, omissions, or deviations from the Drawings and Specifications unless the same shall have been properly requested under Section 4.5 and authorized by, and the cost thereof approved in writing by, Change Order or Construction Change Directive. Owner shall not be liable for, and Contractor shall bear the burden of, any post-bid escalation in the costs of materials; but Contractor will retain the benefit of any post-bid cost decreases. No extension of time for performance of the Work shall be allowed hereunder unless request for such extension is properly made under Section 4.5 and such time is thereof approved in writing by Change Order or Construction Change Directive. The provisions of the Contract Documents shall apply to all such changes, additions, and omissions with the same effect as if originally embodied in the Drawings and Specifications.

7.1.2 AUTHORITY TO ORDER MINOR CHANGES

The Owner has authority to order minor changes in the Work not involving any adjustment in the Contract Sum, an extension of the Contract Time, or a change which is inconsistent with the intent of the Contract Documents. Such changes shall be effected by written Construction Change Directive and shall be binding on the Contractor. The Contractor shall carry out such written orders promptly.

7.2 CHANGE ORDERS (“CO”)

A CO is a written instrument signed by the Owner and the Contractor, stamped (or sealed) and signed by Architect, and approved by the Owner’s Governing Board and DSA, stating the agreement of Owner and Contractor upon all of the following:

- A. A change in the Work;
- B. The amount of the adjustment in the Contract Sum, if any; and
- C. The extent of the adjustment in the Contract Time, if any.

Unless expressly stated otherwise in the CO, any CO executed by Owner and Contractor constitutes and includes full and complete money and time (including but not limited to, adjustments to money and time) for all costs and effects caused by any of the changes described within it. Unless expressly stated otherwise in the CO, in consideration for the money received for the changes described in the CO, Contractor waives all Claims for all costs and effects caused by any of the changes, including but not limited to labor, equipment, materials, delay, extra work, overhead (home and field), profit, direct costs, acceleration, disruption, impaired productivity, time extensions, and any the costs and effects on Subcontractors and suppliers of any tier.

7.3 CONSTRUCTION CHANGE DIRECTIVES (“CCD”)

7.3.1 DEFINITION

A CCD is a written unilateral order signed by the Owner directing performance of the Work or a change in the Work. The CCD may state an adjustment in the Contract Sum, Contract Time, or Milestone Deadline. The Owner may by CCD, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions pursuant to Section 7.1.1.

7.3.2 USE TO DIRECT CHANGE

A CCD shall be used in the absence of agreement on the terms of a CO. If Contractor disagrees with the terms of a CCD, it shall nevertheless perform the work directed by the CCD, but it may pursue the Notice of Potential Change, COR and Claim procedures of Section 4.5 if Contractor believes it is entitled to changes in the Contract Sum or Contract Time.

7.4 REQUEST FOR INFORMATION (“RFI”)

7.4.1 DEFINITION

An RFI is a written request prepared by the Contractor asking the Owner to provide additional information necessary to clarify an item which the Contractor feels is not clearly shown or called for in the drawings or specifications, or to address problems which have arisen under field

conditions.

7.4.2 SCOPE

The RFI shall reference all the applicable Contract Documents including specification section, detail, page numbers, drawing numbers, and sheet numbers, etc. The Contractor shall make suggestions and/or interpretations of the issue raised by the RFI. An RFI cannot modify the Contract Sum, Contract Time, or the Contract Documents.

7.4.3 RESPONSE TIME

Unless Owner expressly directs otherwise in writing, Contractor shall submit RFIs directly to the Architect, with copies forwarded to the Owner. Contractor shall submit a revised and updated priority schedule with each RFI. The Architect shall endeavor to follow the Contractor's requested order of priorities. The Owner and Contractor agree that an adequate time period for the Architect (or other designated recipient of the RFI) to respond to an RFI is generally fourteen (14) calendar days after the Architect's receipt of an RFI, unless the Owner and Contractor agree otherwise in writing. However, in all cases, the Architect shall take such time, whether more or less than 14 days, as is necessary in the Architect's professional judgment to permit adequate review and evaluation of the RFI. If Contractor informs the Architect that it needs a response to an RFI expedited to avoid delay to the critical path, the Architect shall provide a response as quickly as reasonably possible. The total time required for the Architect to respond is subject to the complexity of the RFI, the number of RFI's submitted concurrently and the reprioritization of pending RFI's submitted by the Contractor, among other things. If Contractor believes that the Architect's response results in a change in the Work that warrants additional money or time, or that Architect's response was unreasonably delayed and caused delay to the Work's critical path, Contractor shall follow the procedures for additional money or time under Section 4.5. No presumption shall arise as to the timeliness of the response if the response is more than fourteen (14) days after the Architect's receipt of the RFI. Contractor shall review the Contract Documents before submitting an RFI to ensure that the information is not already in the Contract Documents. To compensate the Owner for time and costs incurred for each time the information was already in the Contract Documents, Owner may withhold \$100 from progress payments or retention in addition to any other remedies which Owner may have the right to pursue.

7.4.4 COSTS INCURRED

The Contractor shall be invoiced by the Owner for any costs incurred for professional services, which shall be withheld from progress payments or retention, if an RFI requests an interpretation or decision of a matter where the information sought is equally available to the party making such request.

7.5 REQUEST FOR PROPOSAL ("RFP")

7.5.1 DEFINITION

An RFP is Owner's written request asking the Contractor to submit to the Owner an estimate of

the effect, including credits, of a proposed change on the Contract Sum and the Contract Time.

7.5.2 SCOPE

An RFP shall contain adequate information, including any necessary drawings and specifications, to enable Contractor to provide the cost breakdowns required by section 7.7. The Contractor shall not be entitled to any additional money for preparing a response to an RFP, whether ultimately accepted or not.

7.6 CHANGE ORDER REQUEST (“COR”)

7.6.1 DEFINITION

A COR is any written request prepared by the Contractor asking the Owner for additional money or time, including a “proposed change order” or “PCO.” However, a Claim (see Sections 4.5.3-4.5.6) is not a COR. See Section 4.5.2 for additional COR requirements. The COR shall include all information necessary to establish the Contractor’s entitlement to additional money or time.

7.6.2 CHANGES IN PRICE

A COR shall include breakdowns per section 7.7 to validate any proposed change in Contract Sum.

7.6.3 CHANGES IN TIME

Where a change in a Milestone Deadline or Contract Time is requested, a COR shall also include delay analysis to validate any proposed change, and shall meet all requirements in these General Conditions, including but not limited to Section 8.4. Any additional time requested shall not be the number of days to make the proposed change, but must be based upon the impact to the Work schedule as defined in section 3.9 and Division 1 of the Specifications.

7.7 PRICE OF CHANGE ORDERS

7.7.1 SCOPE

Any COR shall provide in writing to the Owner, the Architect and any construction manager, the effect of the proposed CO upon the Contract Sum and the actual cost of construction, which shall include a complete itemized cost breakdown of all labor and material showing actual quantities, hours, unit prices, wage rates, required for the change, and the effect upon the Contract Time of such CO.

7.7.2 DETERMINATION OF COST

The amount of the increase or decrease in the Contract Sum resulting from a CO, if any, shall be determined in one or more of the following ways as applicable to a specific situation:

- A. Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- B. Unit prices stated in the Contractor's original bid, the Contract Documents, or subsequently agreed upon between the Owner and the Contractor;
- C. Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- D. By cost of material and labor and percentage of overhead and profit. If the value is determined by this method the following requirements shall apply:

1. **Daily Reports by Contractor.**

a) General: At the close of each working day, the Contractor shall submit a daily report to the Inspector of Record and any construction manager, on forms approved by the Owner, together with applicable delivery tickets, listing all labor, materials, and equipment involved for that day, the location of the work, and for other services and expenditures when authorized concerning extra work items. An attempt shall be made to reconcile the report daily, and it shall be signed by the Inspector of Record and the Contractor. In the event of disagreement, pertinent notes shall be entered by each party to explain points which cannot be resolved immediately. Each party shall retain a signed copy of the report. Reports by Subcontractors or others shall be submitted through the Contractor.

b) Labor: Show names of workers, classifications, and hours worked.

c) Materials: Describe and list quantities of materials used.

d) Equipment: Show type of equipment, size, identification number, and hours of operation, including, if applicable, loading and transportation.

e) Other Services and Expenditures: Describe in such detail as the Owner may require.

2. **Basis for Establishing Costs.**

a) Labor will be the actual cost for wages prevailing locally for each craft or type of workers at the time the extra work is done, plus employer payments of payroll taxes and insurance, health and welfare, pension, vacation, apprenticeship funds, and other direct costs resulting from Federal, State, or local laws, as well as assessments or benefits required by lawful collective bargaining agreements. The use of a labor classification, which would increase the extra work cost, will not be permitted unless the Contractor establishes the necessity for such additional costs. Labor costs for equipment operators and

helpers shall be reported only when such costs are not included in the invoice for equipment rental.

b) Materials shall be at invoice or lowest current price at which such materials are locally available and delivered to the Site in the quantities involved, plus sales tax, freight, and delivery.

The Owner reserves the right to approve materials and sources of supply or to supply materials to the Contractor if necessary for the progress of the Work. No markup shall be applied to any material provided by the Owner.

c) Tool and Equipment Rental. No payment will be made for the use of tools which have a replacement value of \$100 or less.

Regardless of ownership, the rates to be used in determining equipment rental costs shall not exceed listed rates prevailing locally at equipment rental agencies or distributors at the time the work is performed.

The rental rates paid shall include the cost of fuel, oil, lubrication, supplies, small tools, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance, and all incidentals.

Necessary loading and transportation costs for equipment used on the extra work shall be included. If equipment is used intermittently and, when not in use, could be returned to its rental source at less expense to the Owner than holding it at the work Site, it shall be returned unless the Contractor elects to keep it at the work Site at no expense to the Owner.

All equipment shall be acceptable to the Inspector of Record, in good working condition, and suitable for the purpose for which it is to be used. Manufacturer's ratings and modifications shall be used to classify equipment, and equipment shall be powered by a unit of at least the minimum rating recommended by the manufacturer.

d) Other Items. The Owner may authorize other items which may be required on the extra work. Such items include labor, services, material, and equipment which are different in their nature from those required by the Work, and which are of a type not ordinarily available from the Contractor or any of the Subcontractors. Invoices covering all such items in detail shall be submitted with the Application for Payment.

e) Invoices. Vendors' invoices for material, equipment rental, and other expenditures shall be submitted with the COR. If the Application for Payment is not substantiated by invoices or other documentation, the Owner may establish the cost of the item involved at the lowest price which was current at the time of the Daily Report.

f) Overhead, premiums and profit. For overhead, including direct costs, submit with the COR and include: home office overhead, off-Site supervision, CO preparation/negotiation/research for Owner initiated changes, time delays, project interference and disruption, additional guaranty and warranty durations, on-Site supervision, additional temporary protection, additional temporary utilities, additional material handling costs, and additional safety equipment costs.

7.7.3 FORMAT FOR PROPOSED COST CHANGE

The following format shall be used as applicable by the Owner and the Contractor to communicate proposed additions and deductions to the Contract.

	<u>EXTRA</u>	<u>CREDIT</u>
A. Material (attach itemized quantity and unit cost plus sales tax, invoices, receipts, truck tags, etc., for force account work)	_____	_____
B. Labor (attach itemized hours and rates, daily logs, certified payroll, etc.)	_____	_____
C. Equipment (attach any invoices)	_____	_____
D. Subtotal	_____	_____
E. If Subcontractor performed Work, add Subcontractor's overhead and profit to portions performed by Subcontractor, not to exceed fifteen percent (15%) of item D.	_____	_____
F. Liability and Property Damage Insurance, Worker's Compensation Insurance, Social Security, and Unemployment Taxes, not to exceed twenty-five percent (25%) of Item B.	_____	_____
G. Subtotal	_____	_____
H. General Contractor's Overhead and Profit, not to exceed fifteen percent (15%) of Item G; and for work performed by subcontractors, not to exceed five percent (5%).	_____	_____

I.	Subtotal	_____	_____
J.	Bond not to exceed one percent (1%) of Item I.	_____	_____
K.	TOTAL	_____	_____

It is expressly understood that the value of such extra work or changes, as determined by any of the aforementioned methods, expressly includes (1) any and all of the Contractor’s costs and expenses resulting from additional time required on the project or resulting from delay to the project, and (2) any costs of preparing a COR, including but not limited to delay analysis. Any costs or expenses not included are deemed waived.

7.7.4 DISCOUNTS, REBATES, AND REFUNDS

For purposes of determining the cost, if any, of any change, addition, or omission to the Work hereunder, all trade discounts, rebates, refunds, and all returns from the sale of surplus materials and equipment shall accrue and be credited to the Contractor, and the Contractor shall make provisions so that such discounts, rebates, refunds, and returns may be secured, and the amount thereof shall be allowed as a reduction of the Contractor’s cost in determining the actual cost of construction for purposes of any change, addition, or omissions in the Work as provided herein.

7.7.5 ACCOUNTING RECORDS

With respect to portions of the Work performed by COs and CCDs on a time-and-materials, unit-cost, or similar basis, the Contractor shall keep and maintain cost-accounting records satisfactory to the Owner, which shall be available to the Owner on the same terms as any other books and records the Contractor is required to maintain under the Contract Documents.

7.7.6 NOTICE REQUIRED

Contractor shall submit a written Notice of Potential Change for additional money or time pursuant to section 4.5.1.

7.7.7 APPLICABILITY TO SUBCONTRACTORS

Any requirements under this Article 7 shall be equally applicable to COs or CCDs issued to Subcontractors by the Contractor to the same extent required of the Contractor.

7.8 WAIVER OF RIGHT TO CLAIM MONEY OR TIME

Failure to demand money based on costs, or time extensions, as part of a COR constitutes a complete waiver of Contractor’s right to claim the omitted money or time. All money or time for an issue must be included in the COR at the time submitted.

ARTICLE 8

TIME

8.1 DEFINITIONS

8.1.1 CONTRACT TIME

Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Completion of the Work.

8.1.2 NOTICE TO PROCEED

Contractor shall not commence the Work until it receives a Notice to Proceed from Owner. The date of commencement of the Work is the date established in the Notice to Proceed. The date of commencement shall not be postponed by the failure to act of the Contractor or of persons or entities for whom the Contractor is responsible.

8.1.3 DAYS

The term “day” as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

8.2 HOURS OF WORK

8.2.1 SUFFICIENT FORCES

Contractors and Subcontractors shall furnish sufficient forces to ensure the prosecution of the Work, including Work directed pursuant to a CCD (see Section 7.3, above), in accordance with the Construction Schedule.

8.2.2 PERFORMANCE DURING WORKING HOURS

Work shall be performed during regular working hours except that in the event of an emergency or when required to complete the Work in accordance with job progress, work may be performed outside of regular working hours with the advance written consent of the Owner.

8.2.3 LABOR CODE APPLICATION

As provided in Article 3 (commencing at § 1810), Chapter 1, Part 7, Division 2 of the Labor Code, eight (8) hours of labor shall constitute a legal day’s work. The time of service of any worker employed at any time by the Contractor or by any Subcontractor on any subcontract under this Contract, upon the work or upon any part of the work contemplated by this Contract, is limited and restricted to eight (8) hours during any one calendar day and forty (40) hours during any one calendar week, except as hereinafter provided. Notwithstanding the provision hereinabove set forth, work performed by employees of Contractors in excess of eight (8) hours

per day and forty (40) hours during any one week shall be permitted upon this public work with compensation provided for all hours worked in excess of eight (8) hours per day at not less than one and one-half (1-1/2) times the basic rate of pay.

Contractor or subcontractor shall pay to the Owner a penalty of Twenty-five Dollars (\$25.00) for each worker employed in the execution of this Contract by the Contractor, or by any Subcontractor, 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 (1) calendar week, in violation of the provisions of Article 3 (commencing at § 1810), Chapter 1, Part 7, Division 2 of the Labor Code, unless compensation for the workers so employed by Contractor is not less than one and one-half (1-1/2) times the basic rate of pay for all hours worked in excess of eight (8) hours per day.

8.2.4 COSTS FOR AFTER HOURS INSPECTIONS

If the work done after hours is required by the Contract Documents to be done outside the Contractor's or the Inspector of Record's regular working hours, the costs of any inspections, if required to be done outside normal working hours, shall be borne by the Owner.

If the Owner allows the Contractor to do work outside regular working hours for the Contractor's own convenience, the costs of any inspections required outside regular working hours, among other remedies, shall be invoiced to the Contractor by the Owner and withheld from progress payments and/or retention. Contractor shall give Owner at least 48 hours notice prior to working outside regular working hours.

If the Contractor elects to perform work outside the Inspector of Record's regular working hours, costs of any inspections required outside regular working hours, among other remedies, may be invoiced to the Contractor by the Owner and withheld from progress payments and/or retention.

8.2.5 TIME FOR COMMENCEMENT BY SUBCONTRACTORS

Unless otherwise provided in the Contract Documents, all Subcontractors shall commence their Work within two (2) consecutive business days after notice to them by the Contractor and shall prosecute their Work in accordance with the progress of the Work.

8.3 PROGRESS AND COMPLETION

8.3.1 TIME OF THE ESSENCE

Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Milestone Deadlines and Contract Time are reasonable periods for performing the Work.

8.3.2 NO COMMENCEMENT WITHOUT INSURANCE

The Contractor shall not knowingly, except by agreement or instruction of the Owner, in writing, commence operations on the Site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor. The date of commencement of the Work shall not be changed by the effective date of such insurance.

8.3.3 EXPEDITIOUS COMPLETION

The Contractor shall proceed expeditiously to perform the Work, including Work directed pursuant to a CCD (see Section 7.3, above), with adequate forces, labor, materials, equipment, services and management, shall achieve all Milestone Deadlines, and shall achieve Completion within the Contract Time.

8.4 EXTENSIONS OF TIME - LIQUIDATED DAMAGES

Contractor waives all rights and remedies as to any delay experienced during the Work (including any right to rescind the Contract and any right to refuse to perform the Contract) except for the rights and remedies expressly allowed by the Contract (including but not limited to time extensions and delay damages pursuant to this Section 8.4.1 and Section 8.4.2 below, and termination pursuant to Section 14.1 below).

8.4.1 CONDITIONS ALLOWING FOR EXTENSIONS OF TIME TO COMPLETE THE WORK ONLY (EXCUSABLE DELAY)

The Contractor shall be granted a reasonable time extension under the Contract Documents, including but not limited to Sections 3.18 and 4.5 and Article 7, for excusable delays, which are those delays that meet each and every of the following conditions:

- (a) The delay was beyond the control of Contractor and its subcontractors and material suppliers;
- (b) The delay was caused by events that were not reasonably foreseeable to Contractor at the time of bidding;
- (c) All float in the schedule had been used, and the delay impacted and delayed the controlling items of Work (i.e., the as-built critical path, as determined from the as-planned schedule and the actual progress of the Work), thus delaying the achievement of a Milestone Deadline or the Completion of the whole Work within the Contract Time;
- (d) The delay was not caused by Contractor or its subcontractors or suppliers, including but not limited to their breaches of contract or the standard of care;
- (e) The delay was not associated with loss of time resulting from the necessity of submittals to Owner for approval, or from necessary Owner surveys, measurements, inspections and testing;
- (f) The delay was not caused by usual or common weather for the time of year, including usual or common severe weather; and
- (g) The delay could not have been prevented or mitigated by the exercise of care, prudence, foresight, and diligence by Contractor.

Excusable delays may include acts of God, acts of public enemy, acts of the Owner or anyone employed by it, acts of another contractor in performance of a contract (other than this Contract) with the Owner, fires, floods, epidemics, quarantine restrictions, labor disputes, unusual and uncommon weather for the time of year, unforeseen site conditions, or delays of subcontractors due to such causes. Owner shall take into consideration other relevant factors such as concurrent delays. Contractor has the burden of proving that any delay was excusable.

8.4.2 COMPENSABLE DELAY (TIME AND MONEY)

Compensable delays are those excusable delays for which Contractor is also entitled to money. To be compensable, an excusable delay must be one for which the Owner is responsible, where the delay was unreasonable under the circumstances involved, and where the delay was not within the contemplation of the parties; *however*, Contractor shall not be entitled to monetary compensation when (a) Contractor could have reasonably anticipated the delay and avoided or minimized the cost impacts of it, (b) there was a concurrent delay which does not qualify for monetary compensation under this paragraph, (c) the cause of the delay was reasonably unforeseen by the Owner or the delay was caused by factors beyond the control of the Owner, including but not limited to a delay under Section 2.2.8 above or a delay caused by a utility company's failure to perform despite Owner's reasonable arrangements for such performance; or (d) any other defense available to Owner under law or equity applies. Contractor has the burden of proving that any delay was excusable and compensable, including an analysis that establishes non-concurrency. Compensation shall be limited to field overhead (i.e., general conditions) and home office overhead, as may be allowed by law.

8.4.3 NOTICE BY CONTRACTOR REQUIRED; PROCEDURES FOR DEMANDING ADDITIONAL TIME OR MONEY

For notice and other required procedures related to requests by Contractor for additional time or money related to delay, Contractor shall comply with the Contract Documents, including but not limited to Sections 3.18 and 4.5, and Article 7, above.

8.4.4 EARLY COMPLETION

Regardless of the cause therefore, the Contractor may not maintain any Claim or cause of action against the Owner for damages incurred as a result of its failure or inability to Complete its Work on the Project in a shorter period than established in the Contract Documents, the parties stipulating that the period set forth in the Contract Documents is a reasonable time within which to perform the Work on the Project.

8.4.5 LIQUIDATED DAMAGES

Failure to Complete the Work within the Contract Time and in the manner provided for by the Contract Documents, or failure to complete any specified portion of the Work by a milestone deadline, shall subject the Contractor to liquidated damages as described in Article III of the Agreement and the Contract Documents. Accordingly, the parties agree that the amount set forth

in the Agreement shall be presumed to be the amount of damages which the Owner shall directly incur as a result of each calendar day by which Completion of the Work is delayed beyond the Contract Time as adjusted by Change Orders.

In addition, delaying another contractor's work on the Project or causing delay to the *completion* of the Project shall subject the Contractor to liquidated damages as described in Article III of the Agreement and the Contract Documents. Accordingly, the parties agree that the amount set forth in the Agreement shall be presumed to be the amount of damages which the Owner shall directly incur as a result of each calendar day by which Contractor delays the work of others on the Project or *completion* of the Project itself.

If liquidated damages accrue as described above, the Owner, in addition to all other remedies provided by law, shall have the right to assess and withhold as provided in Article III of the Agreement and the Contract Documents.

8.5 GOVERNMENT APPROVALS

Owner shall not be liable for any delays or damages related to the time required to obtain government approvals.

ARTICLE 9

PAYMENTS AND COMPLETION

9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement, later adjusted by Change Orders and Construction Change Directives, and is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

9.2 COST BREAKDOWN

9.2.1 REQUIRED INFORMATION

On forms approved by the Owner, the Contractor shall furnish the following:

- A. Within ten (10) days of the mailing, faxing or delivering of the Notice of Award of the Contract, a detailed breakdown of the Contract Sum (Schedule of Values) for each Project or Site. Each item in the schedule of values shall include its proper share of the overhead and profit.
- B. Within ten (10) days of the mailing, faxing or delivering of the Notice of Award of the Contract, a schedule of estimated monthly payment requests (cash flow) due the Contractor showing the values and construction time of the various portions of the Work to be performed by it and by its Subcontractors or material and equipment suppliers containing such supporting evidence as to its correctness

as the Owner may require;

- C. Five (5) days prior to the submission of a pay request, an itemized breakdown of work done for the purpose of requesting partial payments;
- D. Within ten (10) days of the mailing, faxing or delivering of the Notice of Award of the Contract, the name, address, telephone number, fax number, license number and classification, and for all projects over Twenty-five Thousand Dollars (\$25,000) the public works contractor registration number, of all of its Subcontractors and of all other parties furnishing labor, material, or equipment for its Contract, along with the amount of each such subcontract or the price of such labor, material, and equipment needed for its entire portion of the Work.

9.2.2 OWNER ACCEPTANCE REQUIRED

The Owner shall review all submissions received pursuant to paragraph 9.2.1 in a timely manner. All submissions must be accepted by the Owner before becoming the basis of any payment.

9.3 APPLICATIONS FOR PAYMENT

9.3.1 PROCEDURE

On or before the fifth (5th) day of each calendar month during the progress of the portion of the Work for which payment is being requested, the Contractor shall submit to the Architect, unless there is a construction manager for the Project or the Owner directs otherwise, an itemized Application for Payment for operations completed in accordance with the Schedule of Values through the end of the previous calendar month. Such application shall be notarized, if required, and supported by the following or such portion thereof as the applicable entity requires:

- A. The amount paid to the date of the Application to the Contractor, to all its Subcontractors, and all others furnishing labor, material, or equipment for its Contract;
- B. The amount being requested with the Application for Payment by the Contractor on its own behalf and separately stating the amount requested on behalf of each of the Subcontractors and all others furnishing labor, material, and equipment under the Contract;
- C. The balance that will be due to each of such entities after said payment is made;
- D. A certification that the Record Drawings and Annotated Specifications are current;
- E. The Owner approved additions to and subtractions from the Contract Sum and Time;

- F. A summary of the retentions (each Application shall provide for retention, as set out in Article 9.6);
- G. Material invoices, evidence of equipment purchases, rentals, and other support and details of cost as the Owner may require from time to time;
- H. The percentage of Completion of the Contractor's Work by line item;
- I. A statement showing all payments made by the Contractor for labor and materials on account of the Work covered in the preceding Application for Payment. Such applications shall not include requests for payment of amounts the Contractor does not intend to pay to subcontractors or others because of a dispute or other reason; and
- J. Contractor's monthly reports, daily reports, and monthly schedule updates for all months of Work prior to the Application for Payment that Contractor has not previously submitted.

9.3.2 PURCHASE OF MATERIALS AND EQUIPMENT

As the Contractor is required to order, obtain, and store materials and equipment sufficiently in advance of its Work at no additional cost or advance payment from Owner, to assure that there will be no delays, payment by the Owner for stored material shall be made only in unusual circumstances where the Architect specifically recommends, and Owner specifically approves the payment in writing. If payments are to be made on account of materials and equipment not incorporated in the Work, but delivered and suitably stored at the Site or at some other location agreed upon in writing by the Owner, the payments shall be conditioned upon submission by the Contractor, Subcontractor, or vendor of bills of sale and such other documents satisfactory to the Owner to establish the Owner's title to such materials or equipment free of all liens and encumbrances, and otherwise protect the Owner's interest, including, without limitation, provision of applicable insurance and transportation to the Site. All stored items shall be inventoried, specified by identification numbers (if applicable), released to the Owner by sureties of the Contractor and the Subcontractor and, if stored off-Site, stored only in a bonded warehouse.

9.3.3 WARRANTY OF TITLE

The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances in favor of the Contractor, Subcontractors, material and equipment suppliers, or other persons or entities making a claim by reason of having provided labor, materials, and equipment relating to the Work. Transfer of title to Work does not constitute a waiver by Owner

of any defects in the Work.

9.4 REVIEW OF PROGRESS PAYMENT

9.4.1 OWNER ACCEPTANCE

The Owner will, within seven (7) days after receipt of the Contractor's Application for Payment, either accept such payment or notify the Contractor in writing of the Owner's reasons for withholding acceptance in whole or in part as provided in paragraph 9.5.1.

9.4.2 OWNER'S REVIEW

The review of the Contractor's Application for Payment by the Owner will be based, at least in part, on the Owner's observations at the Site and the data comprising the Application for Payment that the Work has progressed to the point indicated. The review is also subject to an evaluation of the Work for conformance with the Contract Documents, to results of subsequent tests and inspections, to minor deviations from the Contract Documents correctable prior to Completion, and to specific qualifications expressed by the Owner. The Owner may reject the Application for Payment if it is not complete under section 9.3. The issuance of a Certificate for Payment will constitute a representation that the Contractor is entitled to payment in the amount certified, subject to any specific qualifications Owner expresses in the Certificate for Payment. However, Contractor's entitlement to payment may be affected by subsequent evaluations of the Work for conformance with the Contract Documents, test and inspections and discovery of minor deviations from the Contract Documents correctable prior to Completion. The issuance of a Certificate for Payment will not be a waiver by the Owner of any defects in the Work covered by the Application for Payment, nor will it be a representation that the Owner has:

- A. Made exhaustive or continuous on-Site inspections to check the quality or quantity of the Work;
- B. Reviewed construction means, methods, techniques, sequences, or procedures;
- C. Reviewed copies of requisitions received from Subcontractors, material and equipment suppliers, and other data requested by the Owner to substantiate the Contractor's right to payment; or
- D. Made an examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

9.5 DECISIONS TO WITHHOLD PAYMENT

9.5.1 REASONS TO WITHHOLD PAYMENT

The Owner may withhold from a progress payment, in whole or in part, to such extent as may be necessary to protect the Owner due to any of the following:

- A. Defective or incomplete Work not remedied;
- B. Stop Payment Notices. For any stop payment notice, the Owner shall withhold the amount stated in the stop payment notice, the stop notice claimant's anticipated interest and court costs and an amount to provide for the public entity's reasonable cost of any litigation pursuant to the stop payment notice. For any stop payment notice action the parties resolve before judgment is entered, Owner has the right to permanently withhold for any reasonable cost of litigation for that stop payment notice, even if it exceeds the amount originally withheld by Owner for the estimated reasonable cost of litigation. However, if (1) the Contractor at its sole expense provides a bond or other security satisfactory to the Owner in the amount of at least one hundred twenty-five percent (125%) of the claim, in a form satisfactory to the Owner, which protects the Owner against such claim, and (2) the Owner chooses to accept the bond, then Owner would release the withheld stop payment notice funds to the Contractor, except that Owner may permanently withhold for any reasonable cost of litigation. Any stop payment notice release bond shall be executed by a California admitted, fiscally solvent surety, completely unaffiliated with and separate from the surety on the payment and performance bonds, that does not have any assets pooled with the payment and performance bond sureties.
- C. Liquidated damages against the Contractor, whether already accrued or estimated to accrue in the future;
- D. Reasonable doubt that the Work can be Completed for the unpaid balance of any Contract Sum or within the Contract Time;
- E. Damage to the property or work of the Owner, another contractor, or subcontractor;
- F. Unsatisfactory prosecution of the Work by the Contractor;
- G. Failure to store and properly secure materials;
- H. Failure of the Contractor to submit on a timely basis, proper and sufficient documentation required by the Contract Documents, including, without limitation, monthly progress schedules, shop drawings, submittal schedules, schedule of values, product data and samples, proposed product lists, executed change orders, and verified reports;
- I. Failure of the Contractor to maintain record drawings;
- J. Erroneous estimates by the Contractor of the value of the Work performed, or other false statements in an Application for Payment;
- K. Unauthorized deviations from the Contract Documents;

- L. Failure of the Contractor to prosecute the Work in a timely manner in compliance with established progress schedules and Completion deadlines;
- M. Subsequently discovered evidence or observations nullifying the whole or part of a previously issued Certificate for Payment;
- N. Failure by Contractor to pay Subcontractors or material suppliers as required by Contract or law, which includes but is not limited to Contractor's failure to pay prevailing wage and any assessment of statutory penalties;
- O. Overpayment to Contractor on a previous payment;
- P. Credits owed to Owner for reduced scope of work or work that Contractor will not perform;
- Q. The estimated cost of performing work pursuant to Section 2.4;
- R. Actual damages related to false claims by Contractor;
- S. Breach of any provision of the Contract Documents;
- T. Owner's potential or actual loss, liability or damages caused by the Contractor; and
- U. As permitted by other provisions in the Contract or as otherwise allowed by law, including statutory penalties Owner or other entities assessed against Contractor. (See e.g., Labor Code section 1813 (working hours) or Public Contract Code section 4110 (subcontractor listings and substitutions))

Owner may, but is not required to, provide to Contractor written notice of the items for which Owner is withholding amounts from a progress payment.

To claim a breach of contract or violation of law based on wrongful withholding by the Owner from a progress payment or based on a late progress payment, or if Contractor otherwise disputes any progress payment or lack thereof, within fifteen (15) days of the alleged breach of contract, violation of law, or late or disputed progress payment Contractor shall submit a Claim pursuant and subject to Sections 4.5.3-4.5.6. The Contractor need not submit a Notice of Potential Change or a Change Order Request.

For any withheld amount based on an estimate where the actual amount later becomes known and certain, no later than the final accounting for the Contract the Owner will release any amount withheld over that certain and known amount. If the certain and known amount exceeds the amount previously withheld, Owner may withhold additional amounts from Contractor to cover the excess amount. If available funds are not sufficient, Contractor shall pay Owner the difference.

Despite any withholding from a progress payment, or any other dispute about a progress payment, Contractor shall continue to expeditiously perform the Work pursuant to the Contract Documents, including but not limited to General Conditions sections 4.5.8, 7.1.1, 8.3.1, and 8.3.3.

9.5.2 PAYMENT AFTER CURE

When Contractor removes or cures the grounds for withholding amounts, payment shall be made for amounts withheld because of them. No interest shall be paid on any retainage or amounts withheld due to the failure of the Contractor to perform in accordance with the terms and conditions of the Contract Documents.

9.5.3 OVERPAYMENT AND/OR FAILURE TO WITHHOLD

Neither Owner's overpayment to Contractor, nor Owner's failure to withhold an amount from payment that Owner had the right to withhold, shall constitute a waiver by Owner of its rights to withhold those amounts from future payments to Contractor or to otherwise pursue recovery of those amounts from Contractor.

9.6 PROGRESS PAYMENTS

9.6.1 PAYMENTS TO CONTRACTOR

Unless otherwise stated in the Contract Documents, within thirty (30) days after receipt of an undisputed and properly submitted Application for Payment, Contractor shall be paid a sum equal to ninety-five percent (95%) of the undisputed value of the Work performed up to the last day of the previous month, less the aggregate of previous payments; and Owner shall retain the other five percent (5%) of the undisputed value of the Work. The value of the Work completed shall be an estimate only, no inaccuracy or error in said estimate shall operate to release the Contractor, or any bondsman, from damages arising from such Work or from enforcing each and every provision of this Contract, and the Owner shall have the right subsequently to correct any error made in any estimate for payment. Contractor shall base an Application for Payment only on the original Contract Sum plus any fully executed and Board-approved Change Orders. Contractor shall not include Notices of Potential Claims, CORs, Claims or disputed amounts.

The Contractor shall not be entitled to have any payment requests processed, or be entitled to have any payment made for work performed, so long as any lawful or proper direction given by the Owner concerning the Work, or any portion thereof, remains uncomplished with. Payment shall not be a waiver of any such direction.

9.6.2 PAYMENTS TO SUBCONTRACTORS

No later than ten (10) days after receipt of payment from Owner, pursuant to Business and Professions Code section 7108.5, the Contractor shall pay to each Subcontractor, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the

amount to which said Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of such Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

9.6.3 PERCENTAGE OF COMPLETION OR PAYMENT INFORMATION

The Owner will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of Completion or amounts applied for by the Contractor, and action taken thereon by the Owner, on account of portions of the Work done by such Subcontractor.

9.6.4 NO OBLIGATION OF OWNER FOR SUBCONTRACTOR PAYMENT

The Owner shall have no obligation to pay, or to see to the payment of, money to a Subcontractor except as may otherwise be required by law.

9.6.5 PAYMENT TO SUPPLIERS

Payment to material or equipment suppliers shall be treated in a manner similar to that provided in paragraphs 9.6.2, 9.6.3 and 9.6.4.

9.6.6 PAYMENT NOT CONSTITUTING APPROVAL OR ACCEPTANCE

An accepted Application for Payment, issuance of a Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance or approval of any portion of the Work, especially any Work not in accordance with the Contract Documents.

9.6.7 JOINT CHECKS

Owner shall have the right, if necessary for the protection of the Owner, to issue joint checks made payable to the Contractor and Subcontractors and/or material or equipment suppliers. The joint check payees shall be responsible for the allocation and disbursement of funds included as part of any such joint payment. However, Owner has no duty to issue joint checks. In no event shall any joint check payment be construed to create any contract between the Owner and a Subcontractor of any tier, any obligation from the Owner to such Subcontractor, or rights in such Subcontractor against the Owner.

9.7 COMPLETION OF THE WORK

9.7.1 CLOSE-OUT PROCEDURES

When the Contractor considers that the Work is Complete and submits a written notice to Owner requesting an inspection of the Work, the Owner shall review the Work and prepare and submit to the Contractor a comprehensive list of items to be Completed or corrected (the "Punch List"). The Punch List shall include all outstanding obligations of Contractor, including training, start-

up, testing, and submission to Owner of all required documentation (e.g., written guarantees, warranties, invoices, as-built drawings, manuals, bonds, and the documents described in Sections 9.3 and 9.9). The Contractor and/or its Subcontractors shall proceed promptly to Complete and correct items on the Punch List. Failure to include an item on the Punch List does not alter the responsibility of the Contractor to Complete all Work (including the omitted item) in accordance with the Contract Documents, and to Complete or correct the Work so long as the statute of limitations (or repose) has not run.

When the Contractor believes the Punch List Work is Complete and in accordance with the Contract Documents, it shall then submit a request for an additional inspection by the Owner to determine Completion. Owner shall again inspect the Work and inform the Contractor of any items that are not complete or correct. Contractor shall promptly Complete or correct items until no items remain.

After the Work, including all Punch List Work, is inspected and informally deemed by the Owner to be Complete, the Owner's governing body may formally accept the Work as Complete at a meeting of the governing body. Warranties required by the Contract Documents shall commence on the date of Contractor's Completion of the Work (see Sections 3.5, 12.2.5, and 12.2.6).

Owner may record a Notice of Completion as allowed by Civil Code section 9200 *et seq.*

9.7.2 COSTS OF MULTIPLE INSPECTIONS

More than two (2) requests by Contractor to make inspections to confirm Completion as required under paragraph 9.7.1 shall be considered an additional service of Owner, and all subsequent costs will be invoiced to Contractor and withheld from remaining payments.

9.8 PARTIAL OCCUPANCY OR USE

The Owner may occupy or use any completed, or partially completed, portion of the Work at any stage prior to acceptance, or prior to Completion if there is no formal acceptance. Occupancy or use of any portion of the Work, or the whole Work, shall not constitute approval or acceptance of it, nor shall such occupancy or use relieve Contractor of any of its obligations under the Contract Documents regarding that portion of, or the whole, Work.

The Owner and the Contractor shall agree in writing to the responsibilities assigned to each of them for payments, security, maintenance, heat, utilities, damage to the Work, insurance, the period for correction of the Work, and the commencement of warranties required by the Contract Documents. When the Contractor considers a portion complete, the Contractor may request an inspection of that portion and preparation of a Punch List by the Owner for that portion, as set forth for the entire Work under paragraph 9.7.1; however, such inspection and Punch List shall not act as any form of approval or acceptance of that portion of the Work, or of any Work not complying with the requirements of the Contract, and that portion shall be subject to subsequent inspections and Punch Lists.

Immediately prior to such partial occupancy or use, the Owner, the Architect and the Contractor shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

9.9 FINAL PROGRESS PAYMENT AND RELEASE OF RETENTION

9.9.1 FINAL APPLICATION FOR PROGRESS PAYMENT

When, pursuant to Section 9.7.1, the Owner finds all of the Work is Completed in accordance with the Contract Documents, it shall so notify Contractor, who shall then submit to the Owner its final Application for Payment.

Upon receipt and approval of such final Application for Payment, the Owner shall issue a final Certificate of Payment, based on its knowledge, information, and belief, and on the basis of its observations, inspections, and all other data accumulated or received by the Owner in connection with the Work, that such Work has been Completed in accordance with the Contract Documents. If required to do so under Labor Code section 1773.3, subd. (d), Owner shall withhold final payment.

9.9.2 PROCEDURES FOR APPLICATION FOR FINAL PROGRESS PAYMENT

The Application for Final Progress Payment pursuant to Section 9.9.1 shall be accompanied by the same details as set forth in paragraph 9.3, and in addition, the following conditions must be fulfilled:

- A. The Work shall be Complete, and the Contractor shall have made, or caused to have been made, all corrections to the Work which are required to remedy any defects therein, to obtain compliance with the Contract Documents or any requirements of applicable codes and ordinances, or to fulfill any of the orders or directions of Owner required under the Contract.
- B. Each Subcontractor shall have delivered to the Contractor all written guarantees, warranties, applications, and bonds required by the Contract Documents for its portion of the Work, and Contractor delivered them to the Owner.
- C. The Contractor shall deliver to the Owner (i) reproducible final Record Drawings and Annotated Specifications showing the Contractor's Work "as built," with the Contractor's certification of the accuracy of the Record Drawings and Annotated Specifications, (ii) all warranties and guarantees, (iii) operation and maintenance instructions, manuals and materials for equipment and apparatus, and (iv) all other documents required by the Contract Documents.
- D. Contractor shall provide extensive assistance in the utilization of any equipment or system such as initial start-up or testing, adjusting and balancing, preparation of operation and maintenance manuals and training personnel for operation and maintenance.

Acceptance of Final Progress Payment shall constitute a complete waiver of Claims except for those previously identified in writing and identified by that payee as unsettled at the time of Final Progress Payment.

9.9.3 RELEASE OF RETAINAGE

Owner shall withhold not less than 5% of the Contract Sum (“retainage,” or “retention”) until Completion and acceptance of the Project, per Public Contract Code section 9203.

Owner may withhold from release or payment of retainage up to 150% of disputed amounts, including but not limited to the issues listed in Section 9.5. If retainage is held in an escrow account pursuant to an escrow agreement under Public Contract Code section 22300 (see Section 9.10) and Owner withholds from release of retainage based on a breach of the Contract, or other default, by Contractor, Owner may withdraw the withheld retainage from the escrow account.

Owner shall release the undisputed retainage within sixty (60) days after Completion of the Project. For this purpose, “Completion” is defined in Public Contract Code section 7107(c). No interest shall be paid on any retainage, or on any amounts withheld, except as provided to the contrary in any Escrow Agreement and General Conditions between the Owner and the Contractor under Public Contract Code section 22300.

To claim a breach of contract or violation of law based on wrongful withholding by the Owner from retention or based on a late payment or late release of retention, or if Contractor otherwise disputes any payment or release of retention or lack thereof, within fifteen (15) days of the alleged breach of contract, violation of law, or late or disputed payment/release of retention Contractor shall submit a Claim pursuant and subject to Sections 4.5.3-4.5.6. The Contractor need not submit a Notice of Potential Change or a Change Order Request.

9.10 SUBSTITUTION OF SECURITIES

In accordance with section 22300 of the Public Contract Code, the Owner will permit the substitution of securities for any retention monies withheld by the Owner to ensure performance under the Contract. At the request and expense of the Contractor, securities equivalent to the amount withheld shall be deposited with the Owner, or with a state or federally chartered bank as the escrow agent, who shall then pay such retention monies to the Contractor. Upon Completion of the Contract, the securities shall be returned to the Contractor if Owner has no basis to withhold under the Contract Documents.

Securities eligible for investment under this section shall include those listed in Government Code section 16430, bank or savings and loan certificates of deposit, interest-bearing, demand-deposit accounts, standby letters of credit, or any other security mutually agreed to by the Contractor and the Owner.

The Contractor shall be the beneficial owner of any securities substituted for monies withheld and shall receive any interest thereon.

Any escrow agreement entered by Owner and Contractor pursuant to Public Contract Code section 22300, shall be substantially similar to the form set forth in Public Contract Code section 22300.

ARTICLE 10

PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

10.1.1 CONTRACTOR RESPONSIBILITY

The Contractor shall have responsibility for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. Each Contractor shall designate a responsible member of its organization whose duties shall include loss and accident prevention, and who shall have the responsibility and full authority to enforce the program. This person shall attend meetings with the representatives of the various Subcontractors employed to ensure that all employees understand and comply with the programs. Contractor will ensure that his employees and Subcontractors cooperate and coordinate safety matters with any other contractors on the Project to form a joint safety effort.

10.1.2 SUBCONTRACTOR RESPONSIBILITY

Subcontractors have the responsibility for participating in, and enforcing, the safety and loss prevention programs established by the Contractor for the Project, which will cover all Work performed by the Contractor and its Subcontractors. Each Subcontractor shall designate a responsible member of its organization whose duties shall include loss and accident prevention, and who shall have the responsibility and full authority to enforce the program. This person shall attend meetings with the representatives of the various Subcontractors employed to ensure that all employees understand and comply with the programs.

10.1.3 COOPERATION

All Subcontractors and material or equipment suppliers, shall cooperate fully with Contractor, the Owner, and all insurance carriers and loss prevention engineers.

10.1.4 ACCIDENT REPORTS

Subcontractors shall promptly report in writing to the Contractor all accidents whatsoever arising out of, or in connection with, the performance of the Work, whether on or off the Site, which caused death, personal injury, or property damage, giving full details and statements of witnesses. In addition, if death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger. Contractor shall thereafter promptly report the facts in writing to the Owner giving full details of the accident.

10.1.5 FIRST-AID SUPPLIES AT SITE

The Contractor will provide and maintain at the Site first-aid supplies for minor injuries.

10.2 SAFETY OF PERSONS AND PROPERTY

10.2.1 THE CONTRACTOR

The Contractor shall take reasonable precautions for the safety of, and shall provide reasonable protection to prevent damage, injury, or loss to:

- A. Employees on the Work and other persons who may be affected thereby;
- B. The Work, material, equipment, tools, construction equipment, and machinery to be incorporated therein or necessary for the proper execution and Completion of the Work, whether in storage on or off the Site, under the care, custody, or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- C. Other property at the Site or adjacent thereto such as trees, shrubs, lawns, walks, pavement, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

10.2.2 CONTRACTOR NOTICES

The Contractor shall give notices and comply with applicable laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on the safety of persons or property or their protection from damage, injury, or loss.

10.2.3 SAFETY BARRIERS AND SAFEGUARDS

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.

10.2.4 USE OR STORAGE OF HAZARDOUS MATERIAL

When use or storage of explosives, other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel. The Contractor shall notify the Owner any time that explosives or hazardous materials are expected to be stored on Site. Location of storage shall be coordinated with the Owner and local fire authorities.

10.2.5 FINGERPRINTING

At its own expense, Contractor shall comply with all fingerprinting requirements under law and Contract, including but not limited to the requirements of Education Code section 45125.2 and the Independent Contractor Student Contact Form which is a part of the Contract. Contractor shall hold harmless, defend and indemnify the Owner under section 3.16, for any costs, including attorneys' fees, Owner incurs from Contractor's failure to comply.

10.3 PROTECTION OF WORK AND PROPERTY

10.3.1 PROTECTION OF WORK

The Contractor and Subcontractors shall continuously protect the Work, the Owner's property, and the property of others, from damage, injury, or loss until the earlier of formal acceptance of the Work or Completion of the Work. The Contractor and Subcontractors shall make good any such damage, injury, or loss, except such as may be solely due to, or caused by, agents or employees of the Owner; except that for projects not solely funded through revenue bonds, (a) Contractor shall not be responsible for damages caused by a tidal wave to the extent that the damages exceed 5% of the Contract Sum, and (b) Contractor shall not be responsible for damages caused by an earthquake above 3.5 on the Richter Scale in magnitude to the extent that the damages exceed 5% of the Contract Sum, per Public Contract Code §7105(a).

10.3.2 PROTECTION FOR ELEMENTS

The Contractor will remove all mud, water, or other elements as may be required for the proper protection and prosecution of its Work. The Contractor shall at all times provide heat, coverings, and enclosures necessary to maintain adequate protection against weather so as to preserve the Work, materials, equipment, apparatus, and fixtures free from injury or damage.

10.3.3 SHORING AND STRUCTURAL LOADING

The Contractor shall not impose structural loading upon any part of the Work under construction or upon existing construction on or adjacent to the Site in excess of safe limits, or loading such as to result in damage to the structural, architectural, mechanical, electrical, or other components of the Work. The design of all temporary construction equipment and appliances used in construction of the Work and not a permanent part thereof, including, without limitation, hoisting equipment, cribbing, shoring, and temporary bracing of structural steel, is the sole responsibility of the Contractor. All such items shall conform to the requirements of governing codes and all laws, ordinances, rules, regulations, and orders of all authorities having jurisdiction. The Contractor shall take special precautions, such as shoring of masonry walls and temporary tie bracing of structural steel work, to prevent possible wind damage during construction of the Work. The installation of such bracing or shoring shall not damage or cause damage to the Work in place or the Work installed by others. Any damage which does occur shall be promptly repaired by the Contractor at no cost to the Owner.

10.3.4 CONFORMANCE WITHIN ESTABLISHED LIMITS

The Contractor and Subcontractors shall confine their construction equipment, the storage of materials, and the operations of workers to the limits indicated by laws, ordinances, permits, and the limits established by the Owner, and shall not unreasonably encumber the premises with construction equipment or materials.

10.3.5 SUBCONTRACTOR ENFORCEMENT OF RULES

Subcontractors shall enforce the Owner's and the Contractor's instructions, laws, and regulations regarding signs, advertisements, fires, smoking, the presence of liquor, and the presence of firearms by any person at the Site.

10.3.6 SITE ACCESS

The Contractor and the Subcontractors shall use only those ingress and egress routes designated by the Owner, observe the boundaries of the Site designated by the Owner, park only in those areas designated by the Owner, which areas may be on or off the Site, and comply with any parking control program established by the Owner such as furnishing license plate information and placing identifying stickers on vehicles.

10.3.7 PROTECTION OF MATERIALS

The Contractor and the Subcontractors shall receive, count, inspect for damage, record, store, and protect construction materials for the Work and Subcontractors shall promptly send to the Contractor evidence of receipt of such materials, indicating thereon any shortage, change, or damage (failure to so note shall constitute acceptance by the Subcontractor of financial responsibility for any shortage).

10.4 EMERGENCIES

10.4.1 EMERGENCY ACTION

In an emergency affecting the safety of persons or property, the Contractor shall take any action necessary, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional money or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Section 4.5 and Article 7.

10.4.2 ACCIDENT REPORTS

The Contractor shall promptly report in writing to the Owner all accidents arising out of or in connection with the Work, which caused death, personal injury, or property damage, giving full details and statements of any witnesses. In addition, if death, serious personal injuries, or serious property damages are caused, the accident shall be reported immediately by telephone or messenger to the Owner.

10.5 HAZARDOUS MATERIALS

10.5.1 DISCOVERY OF HAZARDOUS MATERIALS

In the event the Contractor encounters or suspects the presence on the Site material reasonably believed to be asbestos, polychlorinated biphenyl (PCB), or any other material defined as being hazardous by section 25249.5 of the California Health and Safety Code, which (a) has not been rendered harmless, and (b) the handling or removal of which is not within the scope of the Work, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner and the Architect in writing, whether such material was generated by the Contractor, another contractor, or the Owner. The Work in the affected area shall not thereafter be resumed, except by written agreement of the Owner and the Contractor, if in fact the material is asbestos, polychlorinated biphenyl (PCB), or other hazardous material, and has not been rendered harmless. The Work in the affected area shall be resumed only in the absence of asbestos, polychlorinated biphenyl (PCB), or other hazardous material, or when it has been rendered harmless by written agreement of the Owner and the Contractor.

10.5.2 HAZARDOUS MATERIAL WORK LIMITATIONS

In the event that the presence of hazardous materials is suspected or discovered on the Site, the Owner shall retain an independent testing laboratory to determine the nature of the material encountered and whether corrective measures or remedial action is required. The Contractor shall not be required pursuant to Article 7 to perform without consent any Work in the affected area of the Site relating to asbestos, polychlorinated biphenyl (PCB), or other hazardous material, until any known or suspected hazardous material has been removed, or rendered harmless, or determined to be harmless by Owner, as certified by an independent testing laboratory and/or approved by the appropriate government agency.

10.5.3 INDEMNIFICATION BY OWNER FOR HAZARDOUS MATERIAL NOT CAUSED BY CONTRACTOR

In the event the presence of hazardous materials on the Site is not caused by the Contractor, Owner shall pay for all costs of testing and remediation, if any, and shall compensate Contractor for any delay or additional costs incurred in accordance with the applicable provisions of Article 7 and 8 herein. Owner shall defend, indemnify and hold harmless the Contractor and its agents, officers, directors and employees from and against any and all claims, damages, losses, costs and expenses incurred in connection with or arising out of, or relating to, the performance of the Work in the area affected by the hazardous material, except to the extent the claims, damages, losses, costs, or expenses were caused by Contractor's active negligence, sole negligence or willful misconduct. By providing this indemnification, Owner does not waive any immunities.

10.5.4 NATURALLY OCCURRING ASBESTOS

If the Site is found to contain naturally occurring asbestos (asbestos naturally contained in rocks which can become airborne when released "NOA"), in addition to complying with applicable provisions in sections 10.5.1-10.5.3 above, Contractor shall comply with, and be solely responsible for, all applicable NOA requirements of the California Air Resources Board

(CARB), California Department of Industrial Relations, California Division of Occupational Safety and Health (Cal/OSHA), any local air quality management district with jurisdiction over the Site, the County, and all other applicable federal, State and local governmental entities. This compliance and responsibility includes, but is not limited to, dust control mitigation measures and a monitoring plan.

10.5.5 INDEMNIFICATION BY CONTRACTOR FOR HAZARDOUS MATERIAL CAUSED BY CONTRACTOR

In the event the presence of hazardous materials on the Site is caused by Contractor, Subcontractors, materialmen or suppliers, the Contractor shall pay for all costs of testing and remediation, if any, and shall compensate the Owner for any additional costs incurred as a result of the generation of hazardous material on the Project Site. In addition, the Contractor shall defend, indemnify and hold harmless Owner and its agents, officers, and employees from and against any and all claims, damages, losses, costs and expenses incurred in connection with, arising out of, or relating to, the presence of hazardous material on the Site, except to the extent the claims, damages, losses, costs, or expenses were caused by Owner's active negligence, sole negligence or willful misconduct.

10.5.6 TERMS OF HAZARDOUS MATERIAL PROVISION

The terms of this Hazardous Material provision shall survive the Completion of the Work and/or any termination of this Contract.

10.5.7 ARCHEOLOGICAL MATERIALS

In the event the Contractor encounters or reasonably suspects the presence on the Site of archeological materials, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner and the Architect in writing. The Work in the affected area shall not thereafter be resumed, except after Contractor's receipt of written notice from the Owner.

ARTICLE 11

INSURANCE AND BONDS

11.1. CONTRACTOR'S LIABILITY INSURANCE

11.1.1 LIABILITY INSURANCE REQUIREMENTS

11.1.1 By the earlier of the deadline set forth in the Instructions to Bidders or the commencement of the Work and within limits acceptable to the Owner, the Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in California as admitted carriers with a financial rating of at least A+, Class XII status as rated in the most recent edition of Best's Insurance Reports such commercial general liability insurance per occurrence for bodily injury, personal injury and property damage as set forth in the

Agreement and automobile liability insurance per accident for bodily injury and property damage combined single limit as set forth in the Agreement as will protect the Contractor from claims set forth below, which may arise out of or result from the Contractor's operations under the Contract and for which the Contractor may be legally liable, whether such operations are by the Contractor, by a Subcontractor, by Sub-subcontractor, by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- 11.1.1.1 claims for damages because of bodily injury (including emotional distress), sickness, disease, or death of any person other than the Contractor's employees. This coverage shall be provided in a form at least as broad as Insurance Services Office (ISO) Form CG 0001 11188;
- 11.1.1.2 claims for damages arising from personal or advertising injury in a form at least as broad as ISO Form CG 0001 11188;
- 11.1.1.3 claims for damages because of injury or destruction of tangible property, including loss of use resulting therefrom, arising from operations under the Contract Documents; and
- 11.1.1.4 claims for damages because of bodily injury, death of a person, or property damage arising out of the ownership, maintenance, or use of a motor vehicle, all mobile equipment, and vehicles moving under their own power and engaged in the Work; and
- 11.1.1.5 claims involving blanket contractual liability applicable to the Contractor's obligations under the Contract Documents, including liability assumed by and the indemnity and defense obligations of the Contractor and the Subcontractors; and
- 11.1.1.6 claims involving Completed Operations, Independent Contractors' coverage, and Broad Form property damage, without any exclusions for collapse, explosion, demolition, underground coverage, and excavating. (XCU)

If commercial general liability insurance or another insurance form with a general aggregate limit is used, either the general aggregate limit shall apply separately to the project location (with the ISO CG 2501 or insurer's equivalent endorsement provided to the Owner) or the general aggregate limit shall be twice the required occurrence limit.

Any deductible or self-insured retention must be declared to and approved by the Owner. At the option of the Owner, either the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the Owner, its Board of Trustees, members of its Board of Trustees, officers, employees, agents and volunteers; or the Contractor shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses.

11.1.2 SUBCONTRACTOR INSURANCE REQUIREMENTS

The Contractor shall require its Subcontractors and any Sub-subcontractors to take out and maintain similar public liability insurance and property damage insurance, in a company or companies lawfully authorized to do business in California as admitted carriers with a financial rating of at least A+, Class XII status as rated in the most recent edition of Best's Insurance Reports, in like amounts and scope of coverage.

11.1.3 OWNER'S INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance. Optionally, the Owner may purchase and maintain other insurance for self protection against claims which may arise from operations under the Contract. The Contractor shall not be responsible for purchasing and maintaining this optional Owner's liability insurance unless specifically required by the Contract Documents.

11.1.4 ADDITIONAL INSURED ENDORSEMENT REQUIREMENTS

The Contractor shall name, on any policy of insurance, the Owner and the Architect as additional insureds. Subcontractors shall name the Contractor, the Owner and the Architect as additional insureds. The Additional Insured Endorsement included on all such insurance policies shall state that coverage is afforded the additional insured with respect to claims arising out of operations performed by or on behalf of the insured. If the additional insureds have other insurance which is applicable to the loss, such other insurance shall be excess to any policy of insurance required herein. The amount of the insurer's liability shall not be reduced by the existence of such other insurance.

11.1.5 WORKERS' COMPENSATION INSURANCE

During the term of this Contract, the Contractor shall provide workers' compensation insurance for all of the Contractor's employees engaged in Work under this Contract on or at the Site of the Project and, in case any of the Contractor's work is sublet, the Contractor shall require the Subcontractor to provide workers' compensation insurance for all the Subcontractor's employees engaged in Work under the subcontract. Any class of employee or employees not covered by a Subcontractor's insurance shall be covered by the Contractor's insurance. In case any class of employees engaged in Work under this Contract on or at the Site of the Project is not protected under the Workers' Compensation laws, the Contractor shall provide or cause a Subcontractor to provide adequate insurance coverage for the protection of those employees not otherwise protected. The Contractor shall file with the Owner certificates of insurance as required under this Article and in compliance with Labor Code section 3700.

If the contractor fails to maintain such insurance, the Owner may take out compensation insurance which the Owner might be liable to pay under the provisions of the Act by reason of an employee of the Contractor being injured or killed, and withhold from progress payments and/or retention the amount of the premium for such insurance.

11.1.6 BUILDER’S RISK/“ALL RISK” INSURANCE

11.1.6.1 COURSE-OF-CONSTRUCTION INSURANCE REQUIREMENTS

Unless provided by Owner at Owner’s sole discretion, Contractor, during the progress of the Work and until final acceptance of the Work by Owner upon Completion of the entire Contract, shall maintain Builder’s Risk/Course-of-Construction insurance satisfactory to the Owner, issued on a completed value basis on all insurable Work included under the Contract Documents. This insurance shall insure against all risks, including but not limited to the following perils: Vandalism, theft, malicious mischief, fire, sprinkler leakage, civil authority, sonic boom, explosion, collapse, flood, earthquake (however, for projects not solely funded through revenue bonds, Contractor is only required to provide insurance for damages caused by an earthquake above 3.5 magnitude on the Richter Scale up to 5% of the Contract Sum [except as provided in Section 11.1.6.3, below; see Public Contract Code §7105(a)], wind, hail, lightning, smoke, riot or civil commotion, debris removal (including demolition) and reasonable compensation for the Architect’s services and expenses required as a result of such insured loss. This insurance shall provide coverage in an amount not less than the full cost to repair, replace or reconstruct the Work. Such insurance shall include the Owner, the Architect, and any other person or entity with an insurable interest in the Work as an additional named insured.

The Contractor shall submit to the Owner for its approval all items deemed to be uninsurable under the Builder’s Risk/Course-of Construction insurance. The risk of the damage to the Work due to the perils covered by the Builder’s Risk/Course-of-Construction insurance, as well as any other hazard which might result in damage to the Work, is that of the Contractor and the surety, and no claims for such loss or damage shall be recognized by the Owner, nor will such loss or damage excuse the Complete and satisfactory performance of the Contract by the Contractor.

11.1.6.2 TIDAL WAVE INSURANCE (NOT USED)

11.1.6.3 EARTHQUAKE INSURANCE

If the Contract is not solely funded through revenue bonds and Owner accepts an alternate bid by Contractor for insurance coverage for an earthquake over 3.5 on the Richter Scale, Contractor shall maintain, in effect during the Work and until final acceptance of the Work by Owner upon Completion of the entire Contract, insurance providing coverage for loss, destruction or damage arising out of or caused by earthquake and/or other earth movement, whether seismic or volcanic in origin, over 3.5 on the Richter Scale in magnitude. This insurance shall provide coverage in an amount not less than the full cost to repair, replace or reconstruct the Work.

11.1.7 CONSENT OF INSURER FOR PARTIAL OCCUPANCY OR USE

Partial occupancy or use in accordance with the Contract Documents shall not commence until the insurance company providing property insurance has consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company and shall, without mutual consent, take no action with

respect to partial occupancy or use that would cause cancellation, lapse, or reduction of the insurance.

11.1.8 FIRE INSURANCE

Before the commencement of the Work, the Contractor shall procure, maintain, and cause to be maintained at the Contractor's expense, fire insurance on all Work included under the Contract Documents, insuring the full replacement value of such Work as well as the cost of any removal and demolition necessary to replace or repair all Work damaged by fire. The amount of fire insurance shall be subject to approval by the Owner and shall be sufficient to protect the Work against loss or damage in full until the Work is accepted by the Owner. Should the Work being constructed be damaged by fire or other causes during construction, it shall be replaced in accordance with the requirements of the drawings and specifications without additional expense to the Owner.

11.1.9 OTHER INSURANCE

The Contractor shall provide all other insurance required to be maintained under applicable laws, ordinances, rules, and regulations.

11.1.10 PROOF OF CARRIAGE OF INSURANCE

The Contractor shall not commence Work nor shall it allow any Subcontractor to commence Work under this Contract until all required insurance, certificates, and an Additional Insured Endorsement and Declarations Page have been obtained and delivered in duplicate to the Owner for approval subject to the following requirements:

- (a) Certificates and insurance policies shall include the following clause:

This policy shall not be non-renewed, canceled, or reduced in required limits of liability or amounts of insurance until notice has been mailed to the Owner. Date of cancellation or reduction may not be less than thirty (30) days after the date of mailing notice.

- (b) Certificates of insurance shall state in particular those insured, the extent of insurance, location and operation to which the insurance applies, the expiration date, and cancellation and reduction notices.
- (c) Certificates of insurance shall clearly state that the Owner and the Architect are named as additional insureds under the policy described and that such insurance policy shall be primary to any insurance or self-insurance maintained by Owner and any other insurance carried by the Owner with respect to the matters covered by such policy shall be excess and non-contributing.

- (d) The Contractor and its Subcontractors shall produce a certified copy of any insurance policy required under this Section upon written request of the Owner.

11.1.11 COMPLIANCE

In the event of the failure of any contractor to furnish and maintain any insurance required by this Article, the Contractor shall be in default under the Contract. Compliance by Contractor with the requirement to carry insurance and furnish certificates, policies, Additional Insured Endorsement and Declarations Page evidencing the same shall not relieve the Contractor from liability assumed under any provision of the Contract Documents, including, without limitation, the obligation to defend and indemnify the Owner and the Architect.

11.2 PERFORMANCE AND PAYMENT BONDS

11.2.1 BOND REQUIREMENTS

Unless otherwise specified in the Contract Documents, prior to commencing any portion of the Work, the Contractor shall apply for and furnish Owner separate payment and performance bonds for its portion of the Work which shall cover 100% faithful performance of and payment of all obligations arising under the Contract Documents and/or guaranteeing the payment in full of all claims for labor performed and materials supplied for the Work. All bonds shall be provided by a corporate surety authorized and admitted to transact business in California. All bonds shall be submitted on the Owner's approved form.

To the extent, if any, that the Contract Sum is increased in accordance with the Contract Documents, the Contractor shall cause the amount of the bonds to be increased accordingly and shall promptly deliver satisfactory evidence of such increase to the Owner. To the extent available, the bonds shall further provide that no change or alteration of the Contract Documents (including, without limitation, an increase in the Contract Sum, as referred to above), extensions of time, or modifications of the time, terms, or conditions of payment to the Contractor will release the surety. If the Contractor fails to furnish the required bond, the Owner may terminate the Contract for cause.

11.2.2 SURETY QUALIFICATION

Only bonds executed by admitted Surety insurers as defined in Code of Civil Procedure section 995.120 shall be accepted. The surety insurers must, unless otherwise agreed to by Owner in writing, at the time of issuance of the bonds, have a rating not lower than "A-" as rated by A.M. Best Company, Inc. or other independent rating companies. Owner reserves the right to approve or reject the surety insurers selected by Contractor and to require Contractor to obtain bonds from surety insurers satisfactory to the Owner.

ARTICLE 12

UNCOVERING AND CORRECTION OF WORK

12.1 UNCOVERING OF WORK

12.1.1 UNCOVERING WORK FOR REQUIRED INSPECTIONS

If a portion of the Work is covered contrary to the Owner's request or to requirements specifically expressed in the Contract Documents, Contractor must, if required in writing by the Owner, uncover it for the Owner's observation and replace the removed work at the Contractor's expense without change in the Contract Sum or Time.

12.1.2 COSTS FOR INSPECTIONS NOT REQUIRED

If a portion of the Work has been covered which the Owner has not specifically requested to observe prior to its being covered, the Owner may request to see such work, and it shall be uncovered by the Contractor. If such work is in accordance with the Contract Documents, costs of uncover and replacement shall, by appropriate Change Order, be paid by the Owner. If such work is not in accordance with Contract Documents, the Contractor shall pay such costs, unless the condition was caused by the Owner or a separate contractor, in which event the Owner shall be responsible for payment of such costs to the Contractor.

12.2 CORRECTION OF WORK; WARRANTY

12.2.1 CORRECTION OF REJECTED WORK

The Contractor shall promptly correct the work rejected by the Owner for failing to conform to the requirements of the Contract Documents, until the statutes of limitation (or repose) and all warranties have run, as applicable, and whether or not fabricated, installed or completed. The Contractor shall bear costs of correcting the rejected work, including additional testing, inspections, and compensation for the Owner's expenses and costs incurred.

12.2.2 REMOVAL OF NONCONFORMING WORK

The Contractor shall remove from the Site portions of the Work which are not in accordance with the requirements of the Contract Documents and are not corrected by the Contractor or accepted or approved by the Owner.

12.2.3 OWNER'S RIGHTS IF CONTRACTOR FAILS TO CORRECT

If the Contractor fails to correct nonconforming work within a reasonable time, the Owner may correct it in accordance with Section 2.4. As part of Owner's correction of the work, the Owner may remove any portion of the nonconforming Work and store any salvageable materials or equipment at the Contractor's expense. If the Contractor does not pay costs of such removal and storage within ten (10) days after written notice, the Owner may upon ten (10) additional days

written notice sell such material 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 compensation for the Architect's and other professionals and representatives' services and expenses, made necessary thereby. If such proceeds of sale do not cover costs which the Contractor should have borne, the Contractor shall be invoiced for the deficiency or Owner may withhold such costs from payment pursuant to Section 9.5. If progress payments or retention then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner.

12.2.4 COST OF CORRECTING THE WORK

The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or separate contractors, whether completed or partially completed, caused by the Contractor's correction or removal of the nonconforming work.

12.2.5 WARRANTY CORRECTIONS (INCLUDES REPLACEMENT)

Pursuant to the warranty in Section 3.5, if within one (1) year after the Completion of the Work or within a longer time period for an applicable special warranty or guarantee required by the Contract Documents, any of the Work does not comply with the Contract Documents, the Contractor shall correct it after receipt of Owner's written notice to do so, unless the Owner has previously waived in writing such right to demand correction. Contractor shall correct the Work promptly, and passage of the applicable warranty period shall not release Contractor from its obligation to correct the Work if Owner provided the written notice within the applicable warranty period. Contractor's obligation to correct the warranty item continues until the correction is made. After the correction is made to Owner's satisfaction, a new warranty period of the same length as the original warranty period shall run on the corrected work. The obligations under this paragraph 12.2.5 shall survive acceptance of the Work under the Contract and termination of the Contract.

12.2.6 NO TIME LIMITATION

Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations which the Contractor might have under the Contract Documents. Establishment of the time period of one (1) year as described in Sections 3.5 and 12.2.5 relates only to the specific warranty obligation of the Contractor to correct the Work after the date of commencement of warranties and has, for example, no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, or to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

12.3 NONCONFORMING WORK AND WITHHOLDING THE VALUE OF IT

If it is found at any time before Completion of the Work that the Contractor has varied from the Contract Documents in materials, quality, form, finish, or in the amount or value of the materials or labor used, the Owner may, in addition to other remedies in the Contract Documents or under

law and as allowed by law, accept the improper Work. The Owner may withhold from any amount due or to become due Contractor that sum of money equivalent to the difference in value between the Work performed and that called for by the Drawings and Specifications. The Owner shall determine such difference in value. No structural related work shall be accepted that is not in conformance with the Contract Documents.

ARTICLE 13

MISCELLANEOUS PROVISIONS

13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located.

13.2 SUCCESSORS AND ASSIGNS

The Owner and the Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to the other party hereto and to partners, successors, assigns, and legal representatives of such other party in respect to covenants, agreements, and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract as a whole or in part without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

13.3 WRITTEN NOTICE

In the absence of specific notice requirements in the Contract Documents, written notice shall be deemed to have been duly served if delivered in person to the individual, member of the firm or entity, or to an officer of the corporation for which it was intended, or if delivered at or sent by registered or certified or overnight mail to the last business address known to the party giving notice. Owner shall, at Contractor's cost, timely notify Contractor of Owner's receipt of any third party claims relating to the Contract pursuant to Public Contract Code section 9201.

13.4 RIGHTS AND REMEDIES

13.4.1 DUTIES AND OBLIGATIONS CUMULATIVE

Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

13.4.2 NO WAIVER

No action or failure to act by the Owner, Inspector of Record, Architect or any construction manager shall constitute a waiver of a right or duty afforded them under the Contract Documents, nor shall such action or failure to act constitute approval of or acquiescence in a

breach thereunder, except as may be specifically agreed to in a written amendment to the Contract.

13.5 TESTS AND INSPECTIONS

13.5.1 COMPLIANCE

Tests, inspections, and approvals of portions of the Work required by the Contract Documents will comply with Title 24, and with all other laws, ordinances, rules, regulations, or orders of public authorities having jurisdiction.

13.5.2 INDEPENDENT TESTING LABORATORY

The Owner will select and pay an independent testing laboratory to conduct all tests and inspections, including shipping or transportation costs or expenses (mileage and hours). Selection of the materials required to be tested shall be made by the laboratory and not by the Contractor. However, if Contractor requests that the Owner use a different testing laboratory and Owner chooses to approve such request, Contractor shall reimburse Owner for any additional shipping or transportation costs or expenses (mileage and hours). Owner may invoice such costs or expenses to the Contractor or withhold such costs or expenses from progress payments and/or retention.

13.5.3 ADVANCE NOTICE TO INSPECTOR OF RECORD

The Contractor shall notify the Inspector of Record a sufficient time in advance of its readiness for required observation or inspection so that the Inspector of Record may arrange for same. The Contractor shall notify the Inspector of Record a sufficient time in advance of the manufacture of material to be supplied under the Contract Documents which must, by terms of the Contract Documents, be tested in order that the Inspector of Record may arrange for the testing of the material at the source of supply.

13.5.4 TESTING OFF-SITE

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 Inspector of Record that such testing and inspection will not be required, shall not be incorporated in the Work.

13.5.5 ADDITIONAL TESTING OR INSPECTION

If the Inspector of Record, the Architect, the Owner, or public authority having jurisdiction determines that portions of the Work require additional testing, inspection, or approval not included under section 13.5.1, the Inspector of Record will, upon written authorization from the Owner, make arrangements for such additional testing, inspection, or approval. The Owner shall bear such costs except as provided in section 13.5.6.

13.5.6 COSTS FOR RETESTING

If such procedures for testing, inspection, or approval under sections 13.5.1, 13.5.2 and 13.5.5 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, the Contractor shall bear all costs arising from such failure, including those of re-testing, re-inspection, or re-approval, including, but not limited to, compensation for the Architect's services and expenses. Any such costs shall be paid by the Owner, invoiced to the Contractor, and, among other remedies, can be withheld from progress payments and/or retention.

13.5.7 COSTS FOR PREMATURE TEST

In the event the Contractor requests any test or inspection for the Project and is not completely ready for the inspection, the Contractor shall be invoiced by the Owner for all costs and expenses resulting from that testing or inspection, including, but not limited to, the Architect's fees and expenses, and the amount of the invoice can among other remedies, be withheld from progress payments and/or retention.

13.5.8 TESTS OR INSPECTIONS NOT TO DELAY WORK

Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

13.6 [INTENTIONALLY LEFT BLANK]

13.7 TRENCH EXCAVATION

13.7.1 TRENCHES GREATER THAN FIVE FEET

Pursuant to Labor Code section 6705, if the Contract Sum exceeds \$25,000 and involves the excavation of any trench or trenches five (5) feet or more in depth, the Contractor shall, in advance of excavation, submit to the Owner or a registered civil or structural engineer employed by the Owner a detailed plan showing the design of shoring for protection from the hazard of caving ground during the excavation of such trench or trenches.

13.7.2 EXCAVATION SAFETY

If such plan varies from the Shoring System Standards established by the Construction Safety Orders, the plan shall be prepared by a registered civil or structural engineer, but in no case shall such plan be less effective than that required by the Construction Safety Orders. No excavation of such trench or trenches shall be commenced until said plan has been accepted by the Owner or by the person to whom authority to accept has been delegated by the Owner.

13.7.3 NO TORT LIABILITY OF OWNER

Pursuant to Labor Code section 6705, nothing in this Article shall impose tort liability upon the

Owner or any of its employees.

13.7.4 NO EXCAVATION WITHOUT PERMITS

The 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 Site prior to the commencement of any excavation.

13.8 WAGE RATES

13.8.1 WAGE RATES

Pursuant to the provisions of Article 2 (commencing at § 1770), Chapter 1, Part 7, Division 2, of the Labor Code, the governing board of the Owner has obtained the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work in the locality in which this public work is to be performed for each craft, classification, or type of worker needed for this Project from the Director of Industrial Relations (“Director”). These rates are on file with the Clerk of the Owner’s Governing Board, and copies will be made available to any interested party on request. The Contractor shall post a copy of such wage rates at the Site.

13.8.2 HOLIDAY AND OVERTIME PAY

Holiday and overtime work, when permitted by law, shall be paid for at a rate of at least one and one-half (1½) times the above specified rate of per diem wages, unless otherwise specified. Holidays shall be defined in the Collective Bargaining Agreement applicable to each particular craft, classification, or type of worker employed.

13.8.3 WAGE RATES NOT AFFECTED BY SUBCONTRACTS

The Contractor shall pay and shall cause to be paid each worker engaged in the Work on the Project not less than the general prevailing rate of per diem wages determined by the Director, regardless of any contractual relationship which may be alleged to exist between the Contractor or any Subcontractor and such workers.

13.8.4 CHANGE IN PREVAILING WAGE DURING BID OR CONSTRUCTION

If during the period this bid is required to remain open, the Director of Industrial Relations determines that there has been a change in any prevailing rate of per diem wages in the locality in which this public work is to be performed, such change shall not alter the wage rates discussed in the Notice to Bidders or the Contract subsequently awarded.

13.8.5 FORFEITURE AND PAYMENTS

Pursuant to Labor Code section 1775, the Contractor and any subcontractor under the Contractor shall as a penalty to the Owner, forfeit not more than Two Hundred Dollars (\$200.00) for each calendar day, or portion thereof, for each worker paid less than the prevailing rate of per diem

wages, determined by the Director, for such craft or classification in which such worker is employed for any public work done under the Agreement by the Contractor or by any Subcontractor under it. Minimum penalties shall apply, as also provided in Civil Code section 1775. The amount of the penalty shall be determined by the Labor Commissioner and shall be based on both of the following: (1) whether the failure of the contractor or subcontractor to pay the correct rate of per diem wages was a good faith mistake and, if so, the error was promptly and voluntarily corrected upon being brought to the attention of the contractor or subcontractor; and (2) whether the contractor or subcontractor has a prior record of failing to meet its prevailing wage obligations. The difference between such prevailing rate of per diem wage and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing rate of per diem wage shall be paid to each work by the Contractor or subcontractor. Labor Code section 1777.1 shall also apply.

13.8.6 MINIMUM WAGE RATES

Any worker employed to perform Work on the Contract, which Work is not covered by any craft or classification listed in the general prevailing rate of per diem wages determined by the Director, shall be paid not less than the minimum rate of wages specified therein for the craft or classification which most nearly corresponds to the Work to be performed by them, and such minimum wage rate shall be retroactive to time of initial employment of such person in such craft or classification.

13.8.7 PER DIEM WAGES

Pursuant to Labor Code section 1773.1, per diem wages includes employer payments for health and welfare, pension, and vacation pay.

13.8.8 POSTING OF WAGE RATES AND OTHER REQUIRED JOB SITE NOTICES

The Contractor shall post at appropriate conspicuous points on the Site, a schedule showing all determined minimum wage rates and all authorized deductions, if any, from unpaid wages actually earned and all other required job site notices as prescribed by regulation.

13.9 RECORD OF WAGES PAID: INSPECTION

13.9.1 APPLICATION OF LABOR CODE

Pursuant to section 1776 of the Labor Code:

(a) Each Contractor and subcontractor shall keep accurate payroll records, showing the name, address, social security number, work classification, and straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the public work. Each payroll record shall contain or be verified by a written declaration that is made under penalty of perjury, stating both of the following:

- (1) The information contained in the payroll record is true and correct.
- (2) The employer has complied with the requirements of sections 1771, 1811 and 1815 for any work performed by his or her employees on the public works project.

(b) The payroll records enumerated under subdivision (a) shall be certified and shall be available for inspection at all reasonable hours at the principal office of the Contractor on the following basis:

(1) A certified copy of an employee's payroll record shall be made available for inspection or furnished to the employee or his or her authorized representative on request.

(2) A certified copy of all payroll records enumerated in subdivision (a) shall be made available for inspection or furnished upon request to a representative of the Owner and the Division of Labor Standards Enforcement of the Department of Industrial Relations ("DIR") and as may be required by the Labor Commissioner under Labor Code section 1771.4). The Contractor and each subcontractor shall furnish a certified copy of all payroll records directly to the Labor Commissioner monthly or more frequently, if so specified in the Agreement and in a format the Labor Commissioner prescribes.

(3) A certified copy of all payroll records enumerated in subdivision (a) shall be made available upon request by the public for inspection or for copies thereof. However, a request by the public shall be made through either the body awarding the contract or the Division of Labor Standards Enforcement of the ... (DIR). If the requested payroll records have not been provided pursuant to paragraph (2), the requesting party shall, prior to being provided the records, reimburse the costs of the preparation by the contractor, subcontractors, and the entity through which the request was made. The public may not be given access to such records at the principal office of the Contractor.

(c) Unless required as of January 1, 2015, to be furnished directly to the Labor Commissioner under Labor Code section 1771.4(a)(3), the certified payroll records shall be on forms provided by the Division of Labor Standards Enforcement (of the DIR) or shall contain the same information as the forms provided by the division. The payroll records may consist of printouts of payroll data that are maintained as computer records, if the printouts contain the same information as the forms provided by the division and the printouts are verified in the manner specified in (a) above.

(d) A Contractor or subcontractor shall file a certified copy of the records enumerated in subdivision (a) with the entity that requested such records within 10 days after receipt of a written request.

(e) Except as provided in subdivision (f), any copy of records made available for

inspection as copies and furnished upon request to the public or any public agency by the awarding body or the Division of Labor Standards Enforcement (of the DIR) shall be marked or obliterated to prevent disclosure of an individual's name, address and social security number. The name and address of the Contractor awarded the Contract or the subcontractor performing the Contract shall not be marked or obliterated. Any copy of records made available for inspection by, or furnished to, a multiemployer Taft-Hartley trust fund (29 U.S.C. Sec. 186(c)(5) that requests the records for the purposes of allocating contributions to participants shall be marked or obliterated only to prevent disclosure of an individual's full social security number, but shall provide the last four digits of the social security number. Any copy of records made available for inspection by, or furnished to, a joint labor-management committee established pursuant to the federal Labor Management Cooperation Act of 1978 (29 U.S.C. Sec. 175a) shall be marked or obliterated only to prevent disclosure of an individual's social security number.

(f) Notwithstanding any other provision of law, agencies that are included in the Joint Enforcement Strike Force on the Underground Economy established pursuant to Section 329 of the Unemployment Insurance Code and other law enforcement agencies investigating violations of law shall, upon request, be provided nonredacted copies of certified payroll records. Any copies of records or certified payroll made available for inspection and furnished upon request to the public by an agency included in the Joint Enforcement Strike Force on the Underground Economy or to a law enforcement agency investigating a violation of law shall be marked or redacted to prevent disclosure of an individual's name, address, and social security number. An employer shall not be liable for damages in a civil action for any reasonable act or omission taken in good faith in compliance with this subsection.

(g) The contractor shall inform the body awarding the contract of the location of the records enumerated under subdivision (a), including the street address, city and county, and shall, within five working days, provide a notice of a change of location and address.

(h) The contractor or subcontractor has 10 days in which to comply subsequent to receipt of written notice requesting the records enumerated in subdivision (a). In the event that the Contractor or subcontractor fails to comply within the 10-day period, he or she shall, as a penalty to the state or political subdivision on whose behalf the contract is made or awarded, forfeit One Hundred Dollars (\$100.00) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Labor Standards Enforcement (of the DIR), these penalties shall be withheld from progress payments then due. A contractor is not subject to a penalty assessment pursuant to this section due to the failure of the subcontractor to comply with this section.

13.10 APPRENTICES

13.10.1 APPRENTICE WAGES AND DEFINITIONS

All apprentices employed by the Contractor to perform services under the Contract shall be paid the standard wage paid to apprentices under the regulations of the craft or trade at which he or she is employed, and shall be employed only at the work of the craft or trade to which he or she is registered. Only apprentices, as defined in section 3077 of the Labor Code, who are in training under apprenticeship standards and written apprenticeship agreements under Chapter 4 (commencing with § 3070) of Division 3, are eligible to be employed under this Contract. The employment and training of each apprentice shall be in accordance with the apprenticeship standards and apprentice agreements under which he or she is training. Contractor shall pay apprentices for any preemployment activities, as set forth in Labor Code section 1777.5.

13.10.2 APPRENTICE LABOR POOL

When the Contractor to whom the Contract is awarded by the Owner, or any Subcontractor under him or her, in performing any of the Work under the Contract or subcontract, employs workers in any apprenticeable craft or trade, the Contractor and 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 Project, for a certificate approving the Contractor or Subcontractor under the apprenticeship standards for the employment and training of apprentices in the area or industry affected. However, approval as established by the joint apprenticeship committee or committees shall be subject to the approval of the Administrator of Apprenticeship. The joint apprenticeship committee or committees, subsequent to approving the subject Contractor or Subcontractor, shall arrange for the dispatch of apprentices to the Contractor or Subcontractor in order to comply with this section. Every Contractor and Subcontractor shall submit the contract award information to the applicable joint apprenticeship committee which shall include an estimate of journeyman hours to be performed under the Contract, the number of apprentices to be employed, and the approximate dates the apprentices will be employed. There shall be an affirmative duty upon the joint apprenticeship committee or committees administering the apprenticeship standards of the crafts or trade in the area of the Site of the public work, to ensure equal employment and affirmative action and apprenticeship for women and minorities. 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. The ratio of work performed by apprentices to journeymen, who shall be employed in the craft or trade on the Project, may be the ratio stipulated in the apprenticeship standards under which the joint apprenticeship committee operates, but, except as otherwise provided in this section, in no case shall the ratio be less than one (1) hour of apprentice work for every five (5) hours of labor performed by a journeyman. However, the minimum ratio for the land surveyor classification shall not be less than one (1) apprentice for each five (5) journeymen.

13.10.3 JOURNEYMAN/APPRENTICE RATIO; COMPUTATION OF HOURS

Any ratio shall apply during any day or portion of a day when any journeyman, or the higher

standard stipulated by the joint apprenticeship committee, is employed at the job Site and shall be computed on the basis of the hours worked during the day by journeymen so employed, except for the land surveyor classification. The Contractor shall employ apprentices for the number of hours computed as above before the end of the Contract. However, the Contractor shall 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 job Site. Where an hourly apprenticeship ratio is not feasible for a particular craft or trade, the Division of Apprenticeship Standards, upon application of a joint apprenticeship committee, may order a minimum ratio of not less than one (1) apprentice for each five (5) journeymen in a craft or trade classification.

13.10.4 JOURNEYMAN/APPRENTICE RATIO

The Contractor or Subcontractor, if he or she is covered by this section upon the issuance of the approval certificate, or if he or she has been previously approved in the craft or trade, shall employ the number of apprentices or the ratio of apprentices to journeymen stipulated in the apprenticeship standards. Upon proper showing by the Contractor that he or she employs apprentices in the craft or trade in the state on all of his or her contracts on an annual average of not less than one (1) hour of apprentice work for every five (5) hours of labor performed by a journeyman, or in the land surveyor classification, one (1) apprentice for each five (5) journeymen, the Division of Apprenticeship Standards may grant a certificate exempting the Contractor from the 1-to-5 hourly ratio as set forth in this section. This section 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 contracts of general contractors or those specialty contractors involve less than Thirty Thousand Dollars (\$30,000) or twenty (20) working days. Any work performed by a journeyman in excess of eight (8) hours per day or forty (40) hours per week, shall not be used to calculate the hourly ratio required by this section.

13.10.4.1 *Apprenticeable Craft or Trade.* “Apprenticeable craft or trade” as used in this Article means a craft or trade determined as an apprenticeable occupation in accordance with the rules and regulations prescribed by the California Apprenticeship Council. 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 a Contractor from the 1-to-5 ratio set forth in this Article when it finds that any one of the following conditions is met:

- A. Unemployment for the previous three-month period in the area exceeds an average of fifteen percent (15%).
- B. The number of apprentices in training in such area exceeds a ratio of 1-to-5.
- C. There is a showing that the apprenticeable craft or trade is replacing at least one-thirtieth (1/30) of its journeymen annually through the apprenticeship training, either on a statewide basis or on a local basis.
- D. Assignment of an apprentice to any work performed under this contract would create a condition which would jeopardize his or her life or the life, safety, or property of fellow employees or the public at large or if the specific task to which

the apprentice is to be assigned is of such a nature that training cannot be provided by a journeyman.

13.10.5 RATIO EXEMPTION

When exemptions are granted to an organization which represents Contractors in a specific trade from the 1-to-5 ratio on a local or statewide basis, the member Contractors will not be required to submit individual applications for approval to local joint apprenticeship committees, if they are already covered by the local apprenticeship standards.

13.10.6 APPRENTICE FUND

A Contractor to whom the Contract is awarded or any Subcontractor under him or her, who, in performing any of the work under the Contract, employs journeymen or apprentices in any apprenticeable craft or trade and who is not contributing to a fund or funds to administer and conduct the apprenticeship program in any such craft or trade in the area of the Site of the Project, to which fund or funds other contractors in the area of the Site of the Project are contributing, shall contribute to the fund or funds in each craft or trade in which he or she employs journeymen or apprentices on the Project in the same amount or upon the same basis and in the same manner as the other contractors do, but where the trust fund administrators are unable to accept the funds, contractors not signatory to the trust agreement shall pay a like amount to the California Apprenticeship Council. The Contractor or Subcontractor may add the amount of the contributions in computing his or her bid for the contract. The Division of Labor Standards Enforcement is authorized to enforce the payment of the contributions to the fund or funds as set forth in the Labor Code section 227.

13.10.7 PRIME CONTRACTOR COMPLIANCE

The responsibility of compliance with section 13.10 and section 1777.5 of the Labor Code for all apprenticeable occupations is with the Prime Contractor.

13.10.8 DECISIONS OF JOINT APPRENTICESHIP COMMITTEE

All decisions of the joint apprenticeship committee under this section 13.10 and Labor Code section 1777.5 are subject to Labor Code section 3081.

13.10.9 NO BIAS

It shall be unlawful for an employer or a labor union to refuse to accept otherwise qualified employees as registered apprentices on any public works on the grounds of race, religious creed, color, national origin, ancestry, sex, or age, except as provided in the Labor Code section 3077.

13.10.10 VIOLATION OF LABOR CODE

Pursuant to Labor Code sections 1777.1 and 1777.7, in the event a Contractor or Subcontractor fails to comply with the provisions of this section 13.10 and Labor Code section 1777.5, among

other things:

- (a) If a Contractor or Subcontractor willfully fails to comply, the Labor Commissioner may deny to the contractor or subcontractor, and to its responsible officers, the right to bid on, or be awarded or perform work as a subcontractor on, any public works project for a period of up to one year for the first violation and for a period of up to three years for the second and subsequent violation. Each period of debarment shall run from the date the determination of noncompliance by the Labor Commissioner becomes a final order.
- (b) A contractor or subcontractor who violates section 1777.5 shall forfeit as a civil penalty an amount not exceeding the sum of One Hundred Dollars (\$100) for each full calendar day of noncompliance. Upon receipt of a determination that a civil penalty has been imposed, the awarding body shall enforce the penalty, which includes withholding the amount of the civil penalty from the contract progress payments or retention then due or to become due.
- (c) In lieu of the penalty provided, the Labor Commissioner may for a first time violation and with the concurrence of an applicable apprenticeship program, order the contractor or subcontractor to provide apprentice employment equivalent to the work hours that would have been provided for apprentices during the period of noncompliance.
- (d) Any funds withheld by the awarding body pursuant to this section shall be deposited in the General Fund.
- (e) The interpretation and enforcement of section 1777.5 and this section shall be in accordance with the regulations of the California Apprenticeship Council.

Pursuant to Public Contract Code section 6109, no contractor or subcontractor may bid on, be awarded, or perform work as a subcontractor on a public works project if ineligible to bid or work on, or be awarded, a public works project pursuant to section 1777.1 of the Labor Code.

13.11 ASSIGNMENT OF ANTITRUST CLAIMS

13.11.1 APPLICATION

Pursuant to Public Contract Code section 7103.5 and Government Code section 4552, in entering into a public works contract or a subcontract to supply goods, services, or materials pursuant to a public works contract, the Contractor or Subcontractor offers and agrees to assign to the Owner all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act, (15 U.S.C. § 15) or under the Cartwright Act (Chapter 2 [commencing with § 16700] of Part 2 of Division 7 of the Bus. & Prof. Code), arising from the purchase of goods, services, or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders Final Progress Payment to the Contractor, without further acknowledgment by the parties. If the Owner

receives, either through judgment or settlement, a monetary recovery for a cause of action assigned under Chapter 11 (commencing with § 4550) of Division 5 of Title 1 of the Government Code, the assignor may, upon demand, recover from the Owner any portion of the recovery, including treble damages, attributable to overcharges that were paid by the assignor but were not paid by the Owner as part of the bid price, less the expenses incurred in obtaining that portion of the recovery.

13.11.2 ASSIGNMENT OF CLAIM

Upon demand in writing by the assignor, the Owner shall, within one (1) 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 the Owner has not been injured thereby or the Owner declines to file a court action for the cause of action.

13.12 AUDIT

Pursuant to and in accordance with the provisions of Government Code section 8546.7, or any amendments thereto, all books, records, and files of the Owner, the Contractor, or any Subcontractor connected with the performance of this Contract involving the expenditure of state funds in excess of Ten Thousand Dollars (\$10,000.00), including, but not limited to, the administration thereof, shall be subject to the examination and audit of the Office of the Auditor General of the State of California for a period of three (3) years after release of all retention under this Contract. Contractor shall preserve and cause to be preserved such books, records, and files for the audit period. During the progress of the Work and for three (3) years after release of all retention under the Contract, Owner shall also have the right to an audit of Contractor's books, records, subcontracts, material and equipment contracts, files, and information related to the project, and Contractor must cooperate by producing all requested items within seven (7) days.

13.13 STORM WATER DISCHARGE PERMIT

If applicable, the Contractor shall file a Notice of Intent to comply with the terms of the general permit to discharge storm water associated with construction activity (WQ Order No. 920-08-DWQ). The Notice of Intent must be sent to the following address along with the appropriate payment (warrant to be furnished by the Owner upon request by the Contractor, allow warrant processing time.): California State Water Resources Control Board, Division of Water Quality, Storm Water Permit Unit, P.O. Box 1977, Sacramento, CA 95812-1977. The Contractor may also call the State Water Board's Construction Activity Storm Water Hotline at (916) 657-1146. The Notice of Intent shall be filed prior to the start of any construction activity.

ARTICLE 14

TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 TERMINATION BY THE CONTRACTOR FOR CAUSE

Contractor may not terminate performance for convenience. Contractor may only terminate performance for cause if the Work is stopped by others for a period of one hundred eighty (180) consecutive days through no act or fault of the Contractor, a Subcontractor of any tier, their agents or employees, or any other persons performing portions of the Work for whom the Contractor is contractually responsible, **and** the Work was stopped by others for one of the following reasons: (A) Issuance of an order of a court or other public authority having jurisdiction which requires Owner to stop all Work; or (B) an act of government, such as a declaration of national emergency, making material unavailable which requires Owner to stop all Work. If such grounds exist, the Contractor may serve written notice of such grounds on Owner and demand a meet-and-confer conference to negotiate a resolution in good faith within twenty (20) days of Owner's receipt of such notice. If such conference does not lead to resolution and the grounds for termination still exist, Contractor may terminate the Contract and recover from the Owner payment for Work executed and for reasonable verified costs with respect to materials, equipment, tools, construction equipment, and machinery, including reasonable overhead, profit, and damages for the Work executed, but excluding overhead (field and home office) and profit for (i) Work not performed and (ii) the period of time that the Work was stopped.

14.2 TERMINATION BY THE OWNER FOR CAUSE

14.2.1 GROUNDS FOR TERMINATION

The Owner may terminate performance of the Contract if the Contractor:

- A. Refuses or fails to supply enough properly skilled workers or proper materials, or refuses or fails to take steps to adequately prosecute the Work to meet a Milestone Deadline or to Complete within the Contract Time;
- B. Fails to make payment to Subcontractors for materials or labor in accordance with Public Contract Code section 10262 or Business and Professions Code section 7108.5, as applicable;
- C. Violates Labor Code section 1771.1(a), subject to the provisions of Labor Code section 1771.1(f);
- D. Disregards laws, ordinances, rules, regulations, or orders of a public authority having jurisdiction; or
- E. Otherwise is in breach of the Contract Documents.

14.2.2 NOTIFICATION OF TERMINATION

When any of the above reasons exist, the Owner may, without prejudice to any other rights or remedies of the Owner, give notice to Contractor of the grounds for termination and demand cure of the grounds within seven (7) days (a “Notice of Intent to Terminate”). If Contractor fails to **either** (a) completely cure the grounds for termination within seven (7) days **or** (b) reasonably commence cure of the grounds for termination within seven (7) days and reasonably continue to cure the grounds for termination until such cure is complete, then Owner may terminate the performance of Contract effective immediately upon service of written Notice of Termination and may, subject to any prior rights of Contractor’s surety on the performance bond (“Surety”):

- A. Take possession of the Site and of all material, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- B. Accept assignment of subcontracts pursuant to section 5.4; and
- C. Complete the Work by whatever reasonable method the Owner may deem expedient, including tender of completion to the Surety.

14.2.3 PAYMENTS WITHHELD

If the Owner terminates performance of the Contract for one of the reasons stated in section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is Complete.

14.2.4 PAYMENTS UPON COMPLETION

If the unpaid balance of the Contract Sum exceeds costs of Completing the Work, including compensation for professional services and expenses made necessary thereby, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor shall pay the difference to the Owner. This payment obligation shall survive Completion of the Work.

14.2.5 INCLUSION OF TERMINATION FOR CONVENIENCE

Any purported termination by Owner for cause under this section 14.2, which is revoked or determined to not have been for cause, shall be deemed to have been a termination for convenience effective as of the same date as the purported termination for cause.

14.3 SUSPENSION OR TERMINATION BY THE OWNER FOR CONVENIENCE

14.3.1 SUSPENSION BY OWNER

The Owner may, without cause, order the Contractor in writing to suspend, delay, or interrupt the Work in whole or in part for such period of time as the Owner may determine.

- 14.3.1.1 *Adjustments.* An adjustment shall be made for increases in the cost of pe

rformance of the Contract, including profit on the increased cost of performance caused by suspension, delay, or interruption. No adjustment shall be made to the extent:

- A. That performance is, was or would have been so suspended, delayed, or interrupted by another cause for which the Contractor is responsible; or
- B. That an equitable adjustment is made or denied under another provision of this Contract.

14.3.1.2 *Adjustments for Fixed Cost.* Adjustments made in the cost of performance may have a mutually agreed fixed or percentage fee.

14.3.2 TERMINATION BY THE OWNER FOR CONVENIENCE

14.3.2.1 The Owner may, at any time, terminate performance of the Contract for the Owner's convenience and without cause.

14.3.2.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall:

1. Cease operations as directed by the Owner in the notice;
2. Take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
3. Except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

14.3.2.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination.

14.4 NOT A WAIVER

Any suspension or termination by Owner of performance by Contractor for convenience or cause under this Article 14 shall not act as a waiver of any claims by Owner against Contractor or others for damages based on breach of contract, negligence or other grounds.

14.5 MUTUAL TERMINATION FOR CONVENIENCE

The Contractor and the Owner may mutually agree in writing to terminate performance of this Contract for convenience. The Contractor shall receive payment for all Work performed to the

date of termination in accordance with the provisions of Article 9.

14.6 EARLY TERMINATION

Notwithstanding any provision herein to the contrary, if for any fiscal year of this Contract the governing body of the Owner fails to appropriate or allocate funds for future periodic payments under the Contract after exercising reasonable efforts to do so, the Owner may upon thirty (30) days' notice, order Work on the Project to cease. The Owner will remain obligated to pay for the Work already performed but shall not be obligated to pay the balance remaining unpaid beyond the fiscal period for which funds have been appropriated or allocated and for which the Work has not been done.

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SECTION 011113 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Work included: Construction of the work for **MISSION OAK HIGH SCHOOL AQUATICS COMPLEX, TULARE**, California. The work is defined as all material, labor, equipment and services necessary to do all work shown on the drawings and called for in the Specifications. The Work shall be as indicated on the Contract Documents.
- B. This Section includes the following:
1. Summarizes the Work of the Contract.
 2. Establishes requirements governing the Work.
 3. Identifies the Work that will be performed under separate contracts and the coordination.
 4. Project Site access.
 5. Restrictions under which the project will be constructed.
- C. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

- A. The words "OWNER" and "DISTRICT" are synonymous and interchangeable, when used throughout this Project Manual.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES.
1. Quality Assurance/Control Submittals:
 - a. Certificates:
 - 1) Submit three (3) copies of certificates indicating compliance with the Asbestos Hazard Emergency Regulations Act.

1.4 QUALITY ASSURANCE

- A. Qualifications:
1. Contractor's Qualifications:
 - a. Contractor shall have experience and have successfully completed three (3) projects of similar scope and size to that indicated for this project.
 - b. Contractor shall have demonstrated that they have the resources to perform all of the requirements of this project.

- B. Regulatory Requirements:
1. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of Work, and in accordance with Specification Section - REGULATORY REQUIREMENTS:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the Project is located.
- C. Certifications:
1. The Contractor shall certify in writing that no materials containing Asbestos are incorporated in the work, in accordance with the Asbestos Hazard Emergency Regulations Act.
- D. Contractor's Duties:
1. Except as specifically noted, provide and pay for:
 - a. Labor, material and equipment.
 - b. Tools, construction equipment and machinery.
 - c. Heat and utilities required for construction. See Specification Section - TEMPORARY FACILITIES AND CONTROLS.
 - d. Other facilities and services necessary for proper execution and completion of Work.
 2. Pay legally required sales, consumer and use taxes.
 3. Secure and pay for all site specific as necessary for proper execution and completion of Work.
 - a. Licenses.
 - b. Permits and Fees.
 - c. Government Fees .
 - d. Royalties.
 4. Give required notices.
 5. Promptly submit written notice to Architect of observed variance.
 6. Enforce strict discipline and good order among employees. Do not employ on Work:
 - a. Unfit persons.
 - b. Persons not skilled in assigned task.
 7. Owners Separate Vendors. Refer to OWNER FURNISHED ITEMS for a list it items that have been procured by the District.
 - a. The Contractor shall schedule and coordinate the activities of Districts separate vendors.
 - b. The Contractor shall off-load and store the related materials, and secure them in a location that is monitored and protected.
 - c. Refer to OWNER FURNISHED ITEMS for the items the Contractor shall install and which item the Vendor will install.

1.5 WORK UNDER OTHER CONTRACTS

- A. General Requirements:
1. Work under separate contracts will occur throughout the duration of the project. The work being installed under separate contracts will occur around adjacent to the Contract project site.
 2. Contractor shall coordinate its work with the work under separate Contracts and shall cooperate with the Contractors of these separate Contracts as they occur.

3. Should the Contractor damage and/or otherwise alter work installed under separate contracts, the Contractor is responsible for the repair and/or correction of installed work.
 4. Prior to the installation of the Work, coordinate the work installed or to be installed by separate contracts relative to this project scope of work.
- B. Work by Owner:
1. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this contract or work by Owner. Coordinate the work of this Contract with work performed by Owner.
 2. Concurrent Work: Owner will perform the following construction operations at Project site. Those operations will be constructed simultaneously with work under this Contract.
 - a. Items that are Owner Furnished Contractor Installed and Owner Furnished Owner Installed as indicated on the Contract Drawings and as defined in Specification Section - OWNER FURNISHED ITEMS.
 3. Security and Intrusion Alarm System: Owner's Vendor will design the Intrusion Alarm System and identify pathways that need to be provided under the Contractor's Construction Contract.
- C. Work Under Separate Contracts by Others:
1. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the work of this Contract with work performed under separate contracts.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Access to Site:
1. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of the Project.
 2. Contractor shall be responsible for coordinating access to and from the site throughout the duration of the project. Access to and from the site may vary, based upon timing and duration of separate contracts.
 3. The Contractor shall not use the Off-Site areas, with the exception of the Site Access per Specification Section - TEMPORARY FACILITIES AND CONTROLS, and shall not interfere with the work in these areas.
- B. Contractor Use of Premises:
1. Confine operations at sites to areas permitted by:
 - a. Laws.
 - b. Ordinances.
 - c. Permits.
 - d. Contract Documents.
 2. Do not unreasonably encumber site with materials or equipment.
 3. Assume full responsibility for protection and safekeeping of Contractor's and Owner's material stored on premises, and keep the site and building secure at all times.
 4. Obtain and pay for use of additional storage Work areas needed for operations.
 5. Limit use of Site Work and storage.

1.7 SCHEDULING

- A. The Work of this Project will be constructed under a single contract.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 012300 – ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install or remove all materials, accessories and other related items necessary to add or delete from the Project as indicated by the alternates in the Contract Documents.
 - a. Any services such as utilities that are meant to pass thru the Alternate areas that serve other areas not involved shall be maintained as part of the Base Bid whether indicated or not.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the BID FORM for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the work. No other adjustments are made to the Contract Sum.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 - 1. Quality Assurance/Control Submittals:
 - a. Notification Letter:
 - 1) Submit three (3) copies of Notification Letter to all concerned on the status of all ALTERNATES.

1.4 QUALITY ASSURANCE

- A. Procedures:
 - 1. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into the Project.

ALTERNATES

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- a. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
 - b. Provide Lump Sum Price (and all itemized prices) for construction of the Base Bid and each Alternate Bid on the BID FORM.
- 2. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
 - 3. Execute accepted alternate under the same conditions as other work of the Contract.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. General: All Alternate descriptions are general in nature. Refer to the contract drawings for specific scope of work.

B. ADDITIVE ALTERNATE – SNACK BAR BUILDING P2

- 1. Base Bid:
 - a. BUILDING: Electrical Building P2, as defined in the Architectural Sheets.
 - b. UTILITIES: All associated work defined by the Plumbing, Fire Sprinklers, and Mechanical and Electrical and Civil Storm Drain connections.
- 2. Alternate Bid:
 - a. BUILDING P2: Add Snack Bar Building P2, as defined in the Architectural Sheets.
 - b. UTILITIES: Add all associated work defined by the Plumbing, Fire Sprinklers, and Mechanical and Electrical and Civil Storm Drain connections.

END OF SECTION

SECTION 012500 – SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Work that is substituted for Work specified in DIVISIONS 02 through 49 shall meet the requirements of this Section.
 2. Provide all material, labor, equipment and services necessary to completely install all approved substituted materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 3. See the INSTRUCTIONS TO BIDDERS or the GENERAL CONDITIONS for any time limits set for the submittal of substitutions.
 4. Substitutions can be requested in two ways: a. "Prior to Bid Opening", and b. "After Award of the Contract":
 - a. "Prior to Bid Opening": The Contractor or Bidder must insure that proposed substitutions of materials by the Contractor or Bidder are submitted to the Architect's office no later than fourteen (14) calendar days prior to the Bid Opening for review and possible approval of any equipment or materials thought to be equal to or better than those specified in the drawings or specifications. An Addendum will be issued no later than three (3) calendar days prior to Bid Opening including all equipment and materials deemed equivalent to those specified and approved by the Architect.
 - b. "After Award of the Contract": In accordance with the provisions of Section 3400 of the California Public Contract Code, the Contractor awarded the Contract will be provided a period of thirty-five (35) calendar days after the award of the Contract for submission of data substantiating a request for a substitution of "an equal" item or items.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

- A. Claimant: Bidder, Sub-Contractor, Contractor, Distributor, Supplier, Manufacturer or other entity that is submitting a claim for a substitution.

- B. Substitutions: Substitutions are not a part of the Submittal Process described in Specification Section – SUBMITTAL PROCEDURES. Substitution Requests by a claimant must be reviewed and approved by the Architect before any submittal will be accepted. It is the claimant's responsibility to provide clear and concise documentation to expedite the Architect's review. If the Substitution Request requires re-submission(s) due to the Claimant's inadequate documentation, no time extension will be allowed.
- C. "Or Equal" / "Or Approved Equivalent": Claimant shall request a substitution in accordance with this Specification Section – SUBSTITUTION PROCEDURES.
- D. The Project Manual employs the following methods of specifying products. Claimant shall conform to the directives below for this Project:
1. Product, system or design specified only by reference standards:
 - a. Select any product, system or design meeting reference standards.
 2. Product, system or design specified by naming several products, systems, designs and/or manufacturers:
 - a. Select any product, system, design and/or manufacturer named.
 3. Product, system or design specified by naming several products, systems and/or manufacturers and reference standards:
 - a. Products, systems, designs and/or manufacturer names indicate products, systems, designs and/or manufacturers that (in the Architect's opinion) meets the reference standards.
 - b. Select any of the named manufacturer's products, systems or designs meeting the reference standards.
 4. Product, system or design specified by naming one or more products, systems, designs and stating "or equal to", "or approved equivalent" with the specified products, systems or designs:
 - a. Select product, system or design specified, "or approved equivalent".
 5. Product, system or design specified by naming only one product, system or design:
 - a. Select product, system or design specified, "or approved equivalent".
 6. Product, system or design specified by naming only one product, system or design and followed by the statement "DISTRICT STANDARD – NO SUBSTITUTIONS":
 - a. Provide product, system or design specified. No substitutions allowed.
- E. Cost to Claimant for review of Substitution Request:
1. Each review of a Substitution Request by the Architect and/or it's Consultant(s) will be billed to the Claimant at an hourly rate of **\$212.00** an hour, two hour minimum for each review, whether approved or rejected.
 - a. Waiver of review fees:
 - 1) When the product has been discontinued or is unavailable.
 - a) EXCEPTION: Where the claimant has failed to order in a timely manner and waits until the last minute, no consideration of the waiver of fees will be allowed; no time extensions will be allowed.
 - 2) When the Owner has requested a substitution.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - INSTRUCTIONS TO BIDDERS:

- B. Content of Request:
1. Check made payable to DARDEN ARCHITECTS, INC. for the minimum two hour review period for **\$424.00**, non-refundable.
 - a. When additional time is required to review a substitution request beyond the first two hours, the Architect or its consultants will bill the claimant for the time expended in the review process.
 2. Complete the attached **SUBSTITUTION REQUEST FORM** substantiating compliance of proposed substitution with Contract Documents. **NO OTHER FORMS WILL BE ACCEPTED.**
 3. Attach to the SUBSTITUTION REQUEST FORM an itemized comparison of proposed substitution with product, system or design specified.
 4. For products or systems, attach to the SUBSTITUTION REQUEST FORM:
 - a. Product, system or design identification, including manufacturer's name and address.
 5. Manufacturer's product information: **MUST BE HIGHLIGHTED AND PROJECT SPECIFIC. SUBMITTALS NOT ADEQUATELY MARKED-UP ACCORDING TO PROJECT SPECIFICS WILL BE REJECTED:**
 - a. Literature including product, system or design description, performance and test data and reference standards.
 - b. Samples.
 - c. Warranties.
 6. For construction methods, attach to the SUBSTITUTION REQUEST FORM:
 - a. Detailed description of proposed methods.
 - b. Drawings illustrating methods.
- C. Submit three (3) copies of Substitution Request including all attached data.

1.4 QUALITY ASSURANCE

- A. Qualifications:
1. Product, system or design qualifications:
 - a. In making a request for substitution, Claimant certifies that:
 - 1) Claimant has personally investigated proposed product, system or design, and determined that it is equal or superior in all respects to that specified.
 - 2) Claimant shall provide the same guarantee or warranty for substitution as for product, system or design specified.
 - 3) Claimant shall coordinate installation of accepted substitution into the Project, making such changes as may be required for the Project to be complete in all respects.
 - 4) Claimant waives all claims for additional costs related to substitution which subsequently become apparent for integrating the substituted product, system or design into the Project.
 - 5) Claimant waives all claims for time extension(s) due to improper documentation requiring re-submission(s) of a Substitution Request Review.
- B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:

- a. Products (and installation standards), systems or methods used for this Project shall comply with CARB standards in effect at the Project Site, and at the time of installation.
- C. Acceptance of Substitutions:
- 1. Procedures:
 - a. The Contract is based on products, systems or designs described in the Contract Documents.
 - b. Architect will consider proposals submitted in accordance with time limits set within the Specification Section - INSTRUCTIONS TO BIDDERS.
 - c. Architect is solely responsible for judging the acceptance of substitutions.
 - 1) Acceptance of a substitution does not waive the product manufacturer's responsibility for product liability. The Architect will judge (based on the substitution submission data) for function and use – product liability shall remain the responsibility of the product manufacturer.
 - d. Substitute products, systems or designs shall not be used unless the substitutions have been specifically approved for this Project by the Architect.
 - 1) Substitute products, systems or designs that are related to structural, fire and life safety or access compliance shall not be used unless such substitution have been specifically approved for this Project by the Architect and the appropriate authority having jurisdiction.
 - 2. Substitutions will not be considered if:
 - a. They are indicated or implied on product submittals in accordance with Specification Section - SUBMITTAL PROCEDURES. Substitutions are not Submittals, and must be reviewed and approved prior to being submitted as a Submittal.
 - b. Acceptance will require substantial revision of Contract Documents.
 - c. They are submitted after the date set for substitutions within this Contract, unless:
 - 1) The specified or drawing item that has been verified to be discontinued or is otherwise unavailable.
 - 2) The Owner proposes a cost savings for the product, system or method.
 - 3) The Owner proposes early occupancy, and the proposed substitution allows for that convenience.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULES

- A. Substitution Request Form:
 - 1. See the form attached to the end of this section.
 - 2. The attached form will be reproduced (and sequentially numbered by the Contractor after the award of the Contract) by the Claimant for any and all proposed substitutions.
 - 3. **NO OTHER FORMS WILL BE ACCEPTED.**

(Attachment)

SUBSTITUTION REQUEST FORM

SUBSTITUTION PROCEDURES

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TO: DARDEN ARCHITECTS, INC. _____ Check attached for minimum review \$400.00.
6790 N. West Avenue
Fresno, CA 93711

CHECK APPROPRIATE LINE:

- _____ Substitution Request Prior to Bid (During Bid Period)
 - _____ Product or System Substitution
 - _____ Design Change Substitution

- _____ Substitution Request After Award of the Contract
 - _____ Product or System Substitution
 - _____ Design Change Substitution

The Contractor Awarded the Contract for this Project shall assign sequential Substitution Request # below.

Leave blank if submitted during the Bid Period.

SUBSTITUTION REQUEST # _____

WE HEREBY SUBMIT FOR YOUR CONSIDERATION THE FOLLOWING PRODUCT OR METHOD AS SUBSTITUTION FOR THE SPECIFIED OR DRAWING ITEM FOR THIS PROJECT:

PROJECT: _____

SPECIFIED ITEM: _____

Specification Section #	Page #	Paragraph #	Description
OR			

DRAWING ITEM: _____

Drawing #	Detail Cut #	Description

PROPOSED CREDIT IF ANY: _____

PROPOSED SUBSTITUTION:

Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents to which the proposed substitution will require for its proper installation.

The undersigned claimant certifies: (Modifications by the claimant to the following list is cause for automatic rejection without further review)

1. The proposed substitution does not affect dimensions shown on drawings or code requirements indicated.
2. The undersigned claimant shall compensate the Architect at a rate of **\$212.00** an hour, two hour minimum for each review (check for **\$424.00** must be attached to this form), for investigation and comments whether or not the request is approved for changes required to the building design, including engineering design, detailing, and construction costs caused by the requested substitution. The Architect is herein defined as any of those firms or individuals listed by reference on the Drawings, including all Consultants identified herein.
3. The proposed substitution will have no adverse affect on other trades, the construction schedule, or specified warranty requirements.
4. Maintenance and service parts will be locally available for the proposed substitution.
5. Attach information for a minimum of three projects where the substitution has been used locally within a 200 mile distance of this project, including names, addresses and telephone numbers of Owners who have accepted this product into their projects.
6. Attach all cost data with explanations if different from Specified or Drawing item. Include in that explanation a discussion on quality of proposed substitution and cost differential.
7. The undersigned claimant shall pay for any subsequent changes in incorporating the proposed substitution that were not apparent at the time of approval into the Work, including compensation to the Architect as described in item 2 above.

The undersigned Claimant(s) declares under penalty of perjury per the California Government Code Section 12650, et seq., that the claim of function, appearance and quality are equivalent or superior to the specified or drawing item, and further know and understand that submission for certification of a false claim may lead to fines, imprisonment and/or other severe legal consequences.

SUBMITTED BY CLAIMANT:

ADDITIONAL CLAIMANT SIGNATURE REQUIRED:

Signature _____
Firm _____

**The Contractor or Construction Manager
if submitted after the Award:**

Address _____

Signature _____
Firm _____

Date _____

Telephone _____

DESIGN CONSULTANT USE ONLY:

- Check Not Attached - Not Accepted
- Accepted
- Accepted as Noted
- Not Accepted
- Received Past Time Period Allowed by Public Contract Code #3400.

By _____ Date _____

Remarks _____

END OF SECTION

SECTION 012973.01 – SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section includes the administrative and procedural requirements necessary to prepare and process the following:
 - 1. Schedule of Values
 - a. Schedule of Bid Values.
 - b. Complete Schedule of Values.
 - 2. Application for Payment with Certification.
- B. Related Requirements: The following Project Manual Sections contain requirements that relate to this section:
 - 1. 01 11 13 SUMMARY OF WORK.
 - 2. 01 21 13 ALLOWANCES.
 - 3. 01 23 00 ALTERNATES.
 - 4. 01 32 16 CONSTRUCTION SCHEDULE.
 - 5. 01 32 36 FORMS AND REPORTS.
 - 6. 01 33 00 SUBMITTAL PROCEDURES.
 - 7. 01 41 00 REGULATORY REQUIREMENTS.

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 Schedule of Values and Payment Request consume cost for time and resources.
- B. Activity Code: Identifies each activity so as to be organized, group and sorted into Sub-Schedules, Areas of Work, and Reports.
- C. Allowances: Contract amounts allocated for specific activities of the project as identified in the contract documents.
- D. Application for Payments: A statement furnished by the Contractor allocating portions of the Contract Sum to various portions of the Work stipulating the amount of work that has been completed to date.
- E. Contingency: Contract amounts allocated for non-specific activities, to cover changes in the contract document work, unforeseen conditions and added scope of work to the project.

- F. Major Scope: Significant portions of work identified as, but not limited to, Base Bid, Alternate Bids, and Construction Phases, and Funding Criteria.
- G. Responsible Party: Entity that is responsible for performing the work of each activity as identified, but not limited to, General Contractor, and Sub-Contractor, second and tertiary tier Sub-Contractors, Manufacturers, Fabricators and Vendors.
- H. Schedule of Values: A statement furnished by the Contractor allocating portions of the Contract Sum to various portions of the Work.
- I. Scope Type: Segments of work identified as, but not limited to, Building ID, On-Site, and Off-Site.
- J. Sub-Schedules: Separated activities identified as part of the same element of work and arranged to show correlation with related elements.

1.4 SUBMITTALS

- A. General:
 - 1. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES.
- B. Format for Submittals: A tabular form type schedules.
 - 1. Provide a working electronic copy of schedule file.
 - a. Provide schedule files in a form that can be reviewed and used by the Owner, and Architect.
 - 2. Provide PDF electronic copy of schedule file.
- C. Assurance/Control Submittals:
 - 1. Schedule of Values.
 - a. Schedule of Bid Values.
 - 1) Submit within fourteen (14) days after the Award of Contract.
 - b. Complete Schedule of Values.
 - 1) Submit at the earliest possible date, but no later than fifteen (15) days prior to the date scheduled for submittal of initial Application for Payment.
 - 2. Application for Payment and Certification.
 - a. Application for Payment and Certification Forms.
 - 1) Submit along with the Complete Schedule of Values submittal.
 - b. Initial Application for Payment.
 - 1) Submit seven (7) prior to due date.
 - c. Application for Payment for Progress of Work.
 - 1) Submit monthly by the date directed by Owner.
 - d. Application for Payment at Substantial Completion.
 - 1) Submit after Architect issues the Certificate of Substantial Completion.
 - e. Final Application for Payment.
 - 1) Submit after competing Project Closeout requirements.

1.5 SYSTEM DESCRIPTION

- A. General:

1. The Architect considers the project Schedule of Values requirements to be significant to both the Contractor and the Owner. The development, submittal, and acceptance of the Schedule of Values, (Bid and Complete), and subsequent development and maintenance of the Application for Payments must be given high priority.
 - a. No payment will be made without the Architect's review and acceptance of the Schedule of Values.
 - b. Progress payments may be withheld in whole or part should the Contractor fail to comply with the requirements of this section.
 - c. No separate payment will be made to the Contractor for any of the requirements of this section. All such costs shall be part of the Contractor's planned project overhead costs included in its bid.

B. Performance Requirements:

1. Schedule of Bid Values: The Schedule of Bid Values shall be a breakdown of the Bid(s) submitted in the Bid Proposal and shall include all work that was bid on, regardless the scope of work awarded for construction. The breakdown shall be sufficient for the use by the Owner and Owner's Consultants to evaluate and determine cost of major scopes of work and the value of other owner agreements that are associated with the dollar value of the bid proposal.
 - a. Refer to Specification Section - SUMMARY OF WORK.
 - b. Refer to Specification Section - ALTERNATES.
2. Complete Schedule of Values: Breakdown of the Contract Sum by specific line-item values, based on the individual activities in the Baseline Project Construction Schedules and to be the basis for the development of the Application for Payment.
 - a. Refer to Specification Section - CONSTRUCTION SCHEDULES.
3. Application for Payments: Shall be derived from Baseline Project Construction Schedule utilizing the costs in the Complete Schedule of Values, and from subsequent Project Construction Schedule Updates, reflecting the Work performed as of planned and actual dates.
 - a. Refer to Specification Section - CONSTRUCTION SCHEDULES.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. The Contractor must have the capacity and capability of supporting the project by producing schedule-related data within two (2) days of request by the Architect, or Owner.

B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Coordination:

1. Coordinate preparation of the Schedule of Bid Values with the submitted Bid Proposal and reflect the major scope of work breakdown described in Specification Section – SUMMARY OF WORK and Specification Section -- ALTERNATES.

2. Coordinate preparation of the Complete Schedule of Values with the preparation of the Baseline Project Construction Schedule. Refer to Specification Section -- CONSTRUCTION SCHEDULES.
 3. Correlate line items in the Complete Schedule of Values with other required administrative forms and schedules, including, but not limited to, the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittals Schedule.
 - c. Items required to be indicated as separate activities in the Baseline Project Construction Schedule.
- B. Project Information:
1. Identification: Include the following Project Identification on all Schedule of Values and Application for Payment.
 - a. Project Name and Location.
 - b. Name of Owner and Address.
 - c. Name of Architect and Address.
 - d. Architect's Project Number.
 - e. Contractor's Name and Address.
 - f. Submittal Date.

2.2 SCHEDULE OF BID VALUES

- A. Format:
1. Arrange the Schedule of Bid Values in tabular form.
 - a. Provide and identify separate columns to indicate the following ;
 - 1) SPECIFICATION SECTION.
 - 2) DESCRIPTION.
 - 3) RESPONSIBLE PARTY.
 - 4) MAJOR SCOPE.
 - 5) DOLLAR VALUE.
 - 6) PERCENTAGE OF THE CONTRACT SUM.
 - b. Provide and identify separate line-items to indicate the following;
 - 1) Activity.
 - 2) Contract Conditions.
 - 3) Allowance(s).
 - 4) Contingency (ies).
 - 5) Grand Totals.
- B. Content:
1. SPECIFICATION SECTION: Use the specification section number in the Project Manual Table of Contents to identify and establish each line-item.
 2. DESCRIPTION: Provide a description of the work for each line-item associated with the specification section and responsible party.
 3. RESPONSIBLE PARTY: Identify the responsible party for performing the work of each line-item associated with the specification section and description.
 4. MAJOR SCOPE: Designate Major scope of work as identified and itemized in BID PROPOSAL.
 - a. Provide separate columns for each Major Scope of Work identified.
 5. DOLLAR VALUE: Sub-Total of the cost for each activity line-item, with the amounts rounded to the nearest dollar.

- a. Assign a dollar value for each line-item to each Major Scope of the project excluding General Conditions, General Requirements and General Contractor's Overhead and Profit.
6. PERCENTAGE OF THE CONTRACT SUM: Dollar Value as a percentage of the Contract Sum to the nearest one-hundredth percent, adjusted to total one hundred percent.
7. Activity: Provide at least one activity item-line for the work in each Specification Section.
 - a. Provide separate activity line items for each Contractor or Subcontractor providing work under the same specification section.
8. Contract Conditions:
 - a. Identify and provide separate activity line-item for cost items that are directly related to Division 01 - GENERAL REQUIREMENTS.
 - b. Identify and provide separate activity line-item for cost items that are directly related to Division 00 - CONDITIONS OF THE CONTRACT.
9. Allowances: Identify and provide separate activity line-item for each Allowance that is assigned for specific work in any specification section. Dollar value to exclude General Contractor's Overhead and Profit.
10. Contingencies: If required, identify and provide separate activity line-item for each Contingency that is not assigned to specific work in any specification section. Dollar value to exclude General Contractor's Overhead and Profit.
 - a. If required, provide separate line items for Owner Contingency and Contractor Contingency.
11. Grand Total: Summation of dollar value for each column equal to the Bids received.

2.3 COMPLETE SCHEDULE OF VALUES

A. Format:

1. Provide a comprehensive, fully developed, detailed Complete Schedule of Values in tabular form.
 - a. Provide and identify the following separate columns to indicate the following for each item listed;
 - 1) SPECIFICATION SECTION.
 - 2) ACTIVITY CODE.
 - 3) DESCRIPTION.
 - 4) RESPONSIBLE PARTY.
 - 5) MAJOR SCOPE.
 - 6) SCOPE TYPE.
 - 7) DOLLAR VALUE.
 - b. Provide and identify separate line-items to indicate the following;
 - 1) Activity.
 - 2) Sub-Schedules.
 - 3) Contract Conditions.
 - 4) Allowance(s).
 - 5) Purchase Contracts (if applicable).
 - 6) Contingency (ies).
 - 7) Grand Totals.

B. Content:

1. SPECIFICATION SECTIONS: As described in the Schedule of Bid Values.

2. **ACTIVITY CODE:** Provide the Activity Identification Code for each line-item indicated as separate activities in the Baseline Project Construction Schedule.
3. **DESCRIPTION:** As described in the Schedule of Bid Values
4. **RESPONSIBLE PARTIES:** As described in the Schedule of Bid Values.
5. **MAJOR SCOPE:** As described in the Schedule of Bid Values.
6. **SCOPE TYPE:** Identify each line-item that is associated with a segment of work.
7. **DOLLAR VALUE:** As described in the Schedule of Bid Values.
8. **Activity:** As described in the Schedule of Bid Values and the following;
 - a. Expand to include entities, which is responsible for performing the work of each activity, identified as, but not limited to, General Contractor, and Sub-Contractor, second and tertiary tier Sub-Contractors, Manufacturers, Fabricators and Vendors.
 - b. Expand to include separate activity line-items for cost items that are directly related to Division 01 - GENERAL REQUIREMENTS and are direct cost of actual work-in-place. Such items shall be, but not limited to, the following;
 - 1) Submittals,
 - 2) Field Engineering
 - 3) Operation and Maintenance Manuals.
 - 4) Demonstration and Training.
9. **Sub-Schedules:**
 - a. **Major Scope of Work:** Provide Sub-Schedules for line-items that are associated with each designated major scope of work as identified in Bid Proposal, and defined in Specification Section -- SUMMARY OF WORK and Specification Section -- ALTERNATES that requires itemization of each line-item value.
 - b. **Scope Type:** Provide Sub-Schedules for line-items that are associated with each specific scope type.
 - 1) **Building Costs:** Detailed cost breakdown of all cost items that are directly related to the Project per Building.
 - a) When the Project Building(s) is of sufficient size to warrant, break the building costs down into areas of work compatible with the Contractor's Means and Methods for construction sequences.
 - b) Building areas may consist of floor and roof levels and partial floor and roof levels.
 - 2) **Project Site Costs:** Detailed cost breakdown of all cost items that are directly related to the Project Site.
 - a) When the Project Site is of sufficient size to warrant, break the site costs down into areas of work compatible with the Contractor's Means and Methods for construction sequences.
10. **Contract Conditions:** As defined in the Schedule of Bid Values and the following;
 - a. Expand to include separate activity line-items for cost items that are directly related to Division 01 - GENERAL REQUIREMENTS and are not direct cost of actual work-in-place. Such items shall be, but not limited to, the following;
 - 1) Temporary Facilities.
 - 2) Field Supervision.
 - 3) Project Identification Sign.
 - 4) Project Closeout Requirements.
 - a) Punch List Activities, and Project Record Documents.
 - b. Expand to include separate activity line-item for cost items that are directly related to Division 00 - CONDITIONS OF THE CONTRACT REQUIREMENTS and are not direct cost of actual work-in-place. Such items shall be, but not limited to, the following;
 - 1) On-Site Facilities and Supervision.

- 2) General Contractor's Overhead and Profit.
- 3) Performance and Labor and Material Bonds.
11. Allowances: As defined in the Schedule of Bid Values.
12. Purchase Contracts: Provide separate line-item in the Schedule of Values for each Purchase Contract, showing the value of the Purchase Contract.
13. Contingencies: As defined in the Schedule of Bid Values.
14. Grand Total: As defined in the Schedule of Bid Values.

PART 3 - EXECUTION

3.1 APPLICATION AND CERTIFICATION FOR PAYMENT

A. General Requirements:

1. Coordination: Coordinate the preparation of the Application for Payment with the preparation of the Complete Schedule of Values and Project Construction Schedule.
 - a. Entries shall match data on the Complete Schedule of Values and Project Construction Schedule and Project Schedule Updates, if revisions were made.
2. Application and Certification for Payment Forms: Use forms accepted by the Architect and Owner for Applications for Payment.
 - a. Form shall be based on AIA Document G702 Application and Certification for Payment and AIA Document G703 Continuation Sheets.
 - b. Submit form for acceptance with initial submittal of Complete Schedule of Values.
3. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of the Contractor. Project Inspector or Architect will return incomplete applications without action.
 - a. Use signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One copy shall include Waivers of Lien and similar attachments if required.
4. Identification: Include the following Project Identification on all Application for Payment:
 - a. Project Name and Location.
 - b. Owner Name.
 - c. Architect's Project Number.
 - d. Contractor Name and Address.
 - e. Application Number.
 - f. Application Date.
 - g. Period To:

B. Format.

1. Provide a comprehensive, fully developed, detailed Application for Payment with Continuation Sheets in tabular form.
 - a. Provide and identify the following separate columns to indicate the following for each item listed;
 - 1) ACTIVITY CODE.
 - 2) DESCRIPTION.
 - 3) SCHEDULED DOLLAR VALUE.
 - 4) WORK COMPLETED.
 - a) FROM PREVIOUS APPLICATION.
 - b) THIS PERIOD.

- 5) TOTAL COMPLETED.
 - 6) PERCENTAGE OF COMPLETION.
 - 7) BALANCE TO FINISH.
 - 8) RETAINAGE.
- b. Provide and identify separate line-items to indicate the following the following;
- 1) Activity.
 - 2) Sub-Schedules.
 - 3) Contract Conditions.
 - 4) Allowance(s).
 - 5) Purchase Contracts (if applicable).
 - 6) Contingency (ies).
 - 7) Grand Totals.
 - 8) Change Orders.
- C. Content:
1. **ACTIVITY CODE:** Provide the Activity Identification Code for each line-item of Work as indicated as separate activities in the Project Construction Schedule
 2. **DESCRIPTION OF WORK:** Provide the same description as indicated in the Schedule of Values for each line item.
 3. **SCHEDULED DOLLAR VALUE:** Provide the same amount as indicated in the Schedule of Values for each line item.
 4. **WORK COMPLETED:** with the following sub-columns.
 - a. **FROM PREVIOUS APPLICATION,** include Dollar Value for work completed in previous Application for Payment, whether or not payment has been received.
 - b. **THIS PERIOD,** include only the Dollar Value for work completed at the time of Application for Payment.
 5. **TOTAL COMPLETED:** The sum Dollar Value of Work Completed and Materials Presently Stored.
 6. **PERCENTAGE OF COMPLETION:** The percentage value of the total Work Completed and the Stored to Date divided by the Scheduled Value.
 7. **BALANCE TO FINISH:** The dollar value of the Scheduled Value minus the Total Completed.
 8. **RETAINAGE:** The dollar value of the percentage of retention per contract agreement.
 9. **Activity:**
 - a. Use the Complete Schedule of Values and Baseline Project Schedule as a guide to establish activity line-items for the Application for Payment.
 - b. Include separate activity line-items when a work activity is separated into stages and requires separate payments for each stage.
 - c. Provide separate line-items for each part of the Work where separate payments will be requested including, but not limited to, submittals, materials, equipment, fabrication and installation.
 - d. Provide separate line items for materials stored but not yet installed, where separate payments will be requested.
 10. **Sub-Schedules:** As described in the Complete Schedule of Values.
 11. **Contract Conditions:** As described in the Complete Schedule of Values.
 12. **Allowances:** As described in the Complete Schedule of Values.
 13. **Purchase Contracts:** As described in the Complete Schedule of Values
 - a. Indicate Owner payments or deposits, if any, and balance to be paid by the Contractor
 14. **Contingencies:** As described in the Complete Schedule of Values.
 15. **Grand Totals:** As described in the Complete Schedule of Values.

16. Change Orders:
 - a. Include amounts of approved Change Orders or Construction Change Directives issued before the last day of construction period covered by application.
- D. Supplemental Information:
 1. Materials Stored: Include in Application for Payment the amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site.
 - b. Provide certificate of insurance or Bonded Warehousing, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
 - c. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 - d. Provide summary documentation for stored materials indicating the following:
 - 1) Materials previously stored and included in previous Applications for Payment.
 - 2) Work completed for this Application utilizing previously stored materials.
 - 3) Additional materials stored with this Application.
 - 4) Total materials remaining stored, including materials with this Application.
 2. Waivers of Mechanic's Lien: With each Application for Payment, submit Waivers of Mechanic's Liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
 - a. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 - b. When an Application shows completion of an item, submit conditional final or full waivers.
 - c. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 - d. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 - e. Waiver Forms: Submit waivers of lien on forms executed in a manner acceptable to Owner.
- E. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for payment include the following:
 1. List of Subcontractors.
 2. Schedule of Values.
 3. Contractor's Construction Schedule (preliminary if not final).
 4. Products List (preliminary if not final).
 5. Submittal Schedule (preliminary if not final).
 6. List of Contractor's Staff Assignments.
 7. List of Contractor's Principal Consultants.
 8. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 9. Initial Progress Report.
 10. Report of Preconstruction Conference.
- F. Application for Payment for Progress of Work:
 1. Each Application for Payment shall be consistent with previous applications and payments as certified by the Project Inspector, Architect, and paid for by the Owner.

2. Payment Applications shall be submitted to the Architect by the date established by the Owner. The maximum period of time covered by each Application for Payment is for one month.
 3. Payments Applications shall be updated to reflect any revised activity in the Project Schedule Updates.
- G. Application for Payment at Substantial Completion: After the issuing of the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portions of the Work claimed as substantially complete.
1. Include documentation supporting the claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- H. Final Application for Payment: Submit Final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement accounting for final changes to the Contract Sum.
 4. "Contractor's Affidavit of Payment of Debts and Claims."
 5. "Contractor's Affidavit of Release of Liens."
 6. "Consent of Surety to Final Payment."
 7. Evidence that claims have been settled.
 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 9. Final liquidated damages settlement statement.

END OF SECTION

SECTION 013113 – CONTRACTOR'S "PROJECT MANAGEMENT" AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely manage and coordinate the Project as necessary to construct and complete the Project as indicated by the Contract Documents.

- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DESCRIPTION:

- A. Manage and Coordinate scheduling, submittals, and work of the various sections of the Project Manual to assure efficient and orderly sequence of installation of construction elements with provisions for accommodating items to be installed later.
 - 1. Coordinate sequence of Work to accommodate Owner Occupancy as specified in the Conditions of the Contract in Division 00 and the General Requirements in Division 01.
 - 2. The Contractor shall set up control procedures so that "approved schedules" are adhered to. Contractor's responsibility is to correctly notify Owner's Representative of anticipated and actual time delays.
 - 3. Contractor's job superintendent shall be on site at all times that the Work is in progress. Superintendent shall not perform other functions such as trade work or parts pick-up.
 - 4. Interruption of Services:
 - a. Adequate advance written notice (a minimum of fourteen (14) days) shall be given to the Owner's Representative when interruptions of utility services, or interference with the use of existing building and roads are anticipated.
 - b. Any interruption of utility services shall be made by the Contractor with the Owner's Representative in attendance. Contractor shall not interrupt any utility services without the Owner's Representative present.
 - 5. Planned utility service shutdowns shall be accomplished during periods of minimum usage.
 - a. In some cases, this may require work outside of normal (7:00 am to 5:00 pm) work hours, at no additional cost to the Owner.
 - b. The Contractor shall program its work so that service will be restored in the minimum possible time, and shall cooperate with the Owner's Representative in reducing shutdowns of utility system.

- c. Adequate advance written notice (a minimum of fourteen (14) days) shall be given to the Owner's representative before interruptions to utility services and other interference to the use of, or access to existing buildings and facilities.
 - d. Required access ways shall be kept open at all times; the use of one way traffic and detours shall be held to a minimum.
- 6. Coordinate the Work and do not delegate the responsibility for coordination to any sub-contractor.
 - 7. Anticipate the interrelationship of all sub-contractors, and their relationships to one another.
 - 8. Resolve differences or disputes between sub-contractors concerning coordination, interference, or extent of Work.

1.3 SUBMITTALS

- A. Schedule and coordinate submittals specified in Specification Section - SUBMITTAL PROCEDURES, and in Specification Section - PROJECT CLOSEOUT.
 - 1. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
 - 2. Coordinate requests for substitutions to assure compatibility of space, of operating elements, and effect on work of other sections.

1.4 QUALITY ASSURANCE

- A. Utility Location Services
 - 1. Retain the services of a utility location contractor to map the site and locate any underground utility within the limits of the work.
 - 2. Call a Local Utility Locator Service (USA – "Underground Service Alert" – (800) 227-2600) for the task of locating any applicable utilities in the area where the Project is located.
 - 3. No allowance for Extra Work will be granted resulting from negligence or failure to meet requirements of this Section. This section prevails over any lesser requirements in the General Conditions.
- B. Coordination of Space:
 - 1. Coordinate use of Project space and sequence of installation of mechanical work, and electrical work, which is indicated diagrammatically on the Drawings. Follow routings shown for pipes, ducts, and conduits as closely as practicable, with due allowance for available physical space.
 - a. Utilize space efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
 - 2. In finished areas, except as otherwise shown, conceal pipes, ducts, and wiring in the construction.
 - a. Coordinate locations of fixtures and outlets with finished elements.
 - 3. Site Utility Coordination:

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- a. Provide 1"=20' scaled and dimensioned Utility Coordination Drawing showing all existing and proposed underground and surface utility improvements including gas, domestic water, fire water, chilled water, hot water, irrigation, storm sewer, sanitary sewer, electrical power, and communications. No site improvements shall be installed prior to Architect's and Owner's review of coordination drawing. Architect's and Owner's review is only for general conformance with the Contract Documents.
- C. Coordination of Project Closeout:
1. Coordinate completion and cleanup of work of separate sections in preparation for Owner occupancy.
 2. After Owner occupancy of premises, coordinate access to site by various sections for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.
 3. Assemble and coordinate closeout submittals specified in Specification Section - PROJECT CLOSEOUT.
- D. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS.
- E. Meetings:
1. Hold coordination meetings and pre-installation meetings with requisite personnel to assure coordination of Work.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

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**USAGE AGREEMENT FOR ELECTRONIC FILES
Release of Liability**

Documents Transmitted By: **Darden Architects, Inc.**
 6790 N. West Ave.
 Fresno CA 93711

PROJECT NAME: _____

ARCHITECT PROJECT NO.: _____

PROJECT ARCHITECT: _____

I _____, as a duly authorized agent of _____ - (Contractor) have an agreement for construction services on the above named project. The Contractor acknowledges having received at least one (1) complete set of Contract Documents for the project and has posted all Addenda and all other contract documents issued to date.

The Contractor is requesting the electronic CAD files of work prepared by the Architect and/or Architect's Consultants (Design Team) on the subject project, so that the information therein may be utilized in the Contractor's work on the same project. The Contractor understands that these files are being provided as a courtesy and they are strictly intended for the Contractor's sole convenience and they are not recognized Contract Documents. This request is subject to the following conditions, which the Contractor hereby agrees to abide by:

1. It is understood and agreed to that any files and/or documents provided are instruments of professional service by the Design Team and are intended for one-time use solely in the construction of this project. They are and shall remain the property of the Architect or the Architect's Consultants, who is deemed to be the author of the drawings and data, and who shall retain all common law, statutory law, and all other rights, including copyrights.
2. The Contractor shall indemnify and hold harmless, the Design Team, its officers, directors, employees or subcontractors, to the fullest extent permitted by law, against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees and defense costs arising out of or resulting from contractor's use of these electronic files, or in any way connected with the modification, misinterpretation, misuse, or reuse by the Contractor or by others.
3. The Contractor agrees that by using these electronic files, the Contractor is in no way relieved of the duty to fully comply with the Contract Documents, including and without limitation, the need to check, confirm and coordinate all dimensions and other details, take field measurements, verify field conditions and coordinate with all other contractors for the project.
4. It is agreed to that these electronic files are not Contract Documents. Differences may exist between electronic files and corresponding hard-copy Contract documents. The Design Team makes no representation regarding the accuracy or completeness of the electronic files provided to the contractor. In the event that a conflict arises, the signed and sealed hard-copy Contract Documents shall govern. Contractor is responsible for determining if any conflict exists.
5. The Contractor understands that the Design Team makes no representation as to the compatibility of these files with Contractor's computer hardware or software. The Contractor understands that the accuracy of the information is an artifact of the techniques used to generate it and is in no way

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intended to imply actual accuracy. It is also understood that the automated conversion of information and data from the system and format used by the Design Team to an alternate system or format cannot be accomplished without the possibility of introduction of inexactitudes, anomalies and errors.

6. Because information presented on the electronic files can be modified, unintentionally or otherwise, the Design Team reserves the right to edit the drawings to remove information deemed not necessary and/or remove all indications of ownership and/or involvement from each electronic display.
7. The Design Team will only furnish those drawings directly applicable to the shop drawings the contractor wishes to create. The Contractor understands that not all electronic files may be available at the Design Team's discretion.
8. The Contractor understands that the Architect's Consultants may have Additional Conditions for release of their electronic files or documents, and the Contractor hereby agree to abide by the Consultants conditions in addition to the stated conditions in this agreement. Additional Conditions (if any) are attached to this agreement.
9. The Contractor understands that the Architect and the Architect's Consultants will incur certain costs in providing the requested electronic files. The Contractor agrees to pay the Design Team a service fee of \$120.00 per sheet, per delivery, prior to any delivery of the electronic files to compensate the Design Team for the labor to prepare and transmit the files and for the additional risk that this transfer will occasion.
10. Under no circumstances shall delivery of the electronic files for use by the Contractor be deemed a sale by the Owner, the Design Team, or any member of the Design Team. The Design Team makes no warranties, either expressed or implied, of merchantability or fitness for any particular purpose. In no event shall the Design Team be liable for any loss of profit or any consequential damages as a result of Contractor's use or reuse of the electronic files.

Darden Architects, Inc.

Description of the requested documents and/or CAD files:

___ Civil ___ Structural ___ Mechanical ___ Electrical ___ Other(s)

Printed Name

Title

Signed

Dated

SECTION 013216 – CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specifications Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - a. Project Construction Schedules.
 - b. Coordination Schedules.
 - c. Schedule Modifications.
 - d. Time Extensions.
- B. Related Requirements:
 - 1. 01 11 13 SUMMARY OF WORK.
 - 2. 01 29 73 SCHEDULE OF VALUES.
 - 3. 01 33 00 SUBMITTAL PROCEDURES.
 - 4. 01 41 00 REGULATORY REQUIREMENTS.
 - 5. 01 45 23 TESTING AND INSPECTION SERVICES.

1.3 DEFINITIONS

- A. The following definitions or terms apply to this specification section:
 - 1. 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.
 - a. Critical Activity is an activity on the critical path that must start and finish on the planned early start and finish times.
 - b. Predecessor Activity is an activity that precedes another scheduled activity.
 - c. Successor Activity: An activity that follows another scheduled activity.
 - 2. Activity Code: Identifies each activity so as to be organized, group and sorted into Sub-Schedules, Areas of Work, and Reports.
 - 3. Construction Schedule: A logical analysis listing the project's milestones, activities, and deliverables with planned dates for performing the scheduled activities and milestones.
 - 4. Critical Path: The longest continuous chain of activities through the schedule that establishes the minimum overall project duration.
 - 5. Event: The starting or ending point of an activity.
 - 6. Float: The measure of leeway in starting and completing an activity.
 - a. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is jointly owned, expiring Project resource is available to both parties as needed to meet the schedule milestones and contract completion date.

- b. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
- c. Total float is the measure of leeway in starting of or completing an activity without adversely affecting the planned Project completion date.
- 7. Milestone: A key or critical point in time for reference or measurement.
- 8. Inclement Weather: Temperature, Precipitation, Fog, and Muddy conditions that may impede the progress of the Project construction on critical activities for more than fifty percent (50%) of the Contractor's scheduled work day.
- 9. Responsibility Code: Identify entities that are responsible for performing the work of each activity as identified, but not limited to, General Contractor, Sub-Contractor, second and tertiary tier Sub-Contractors, Manufacturers, Fabricators and Vendors.
- 10. Unusually Severe Weather: The amount of excessive Inclement Weather that is greater than the anticipated number of Inclement Weather days for any given month.
- 11. Mud Days: The amount of excessive muddy site conditions which prohibit access to and around the Project site, access to buildings and impedes the progress of the Project construction on critical activities as a result of Unusually Severe Weather.
- 12. NOAA: National Oceanic and Atmospheric Administration.

1.4 SUBMITTALS

- A. General:
- B. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES.
- C. Format for Submittals: A time-scaled bar chart and Gantt-chart-type schedules.
 - 1. Provide a working electronic copy of schedule file.
 - 2. Provide schedule files on Compact Disc (CD) or Digital Versatile Disc (DVD) (WINDOWS Formatted Disks) in a form that can reviewed and used by the Owner, and Architect.
 - 3. Provide PDF electronic copy of schedule file.
 - 4. Sheet size shall of adequate size to clearly show the required information for the entire construction period.
 - 5. All required documentation shall have the Submittal number posted in the upper-right hand corner of the page.
- D. Assurance/Control Submittals:
 - 1. Project Construction Schedules:
 - a. Initial Project Schedule (IPS);
 - 1) Submit within fourteen (14) days after the Award of Contract.
 - b. Baseline Project Schedule (BPS);
 - 1) Submit within twenty-one (21) days after the Notice to Proceed date.
 - 2) Sub-Schedules;
 - 3) Submit as requested by Architect or Owner.
 - 2. Coordination Schedules:
 - a. Short Interval Schedules (SIS);
 - 1) Submit at the regularly scheduled meetings.
 - b. Monthly Schedule Updates (MSU);
 - 1) Submit seven (7) days prior to the designated regularly scheduled monthly Progress Meeting for Schedule Review.
 - 2) Submit the agreed upon MSU one week prior to monthly progress payments.

3. Schedule Modifications:
 - a. Change in Sequence;
 - 1) Submit as needed at a regularly scheduled Progress Meeting.
 - b. Recovery Schedule;
 - 1) Submit as needed at a regularly scheduled Progress Meeting.
 - c. Alterations to Schedule;
 - 1) Submit as needed at a regularly scheduled Progress Meeting
4. Time Extension Requests:
 - a. Notice of Delay;
 - 1) Submit within seven (7) days after a delay event, and/or with a Change Order Request (COR) that is in response to a CCD, RFP, or other documents issued by the Architect.
 - b. Inclement Weather;
 - 1) Submit within twenty-four (24) hours after an event.

1.5 SYSTEM DESCRIPTION

A. General:

1. The Architect considers the project schedule requirements to be of significant importance to both the Contractor and the Owner. The development, submittal, acceptance and maintenance of the Initial Project Schedule, Baseline Project Schedule and subsequent Monthly Schedule Updates must be given high priority.
 - a. Progress payments may be withheld in whole or part should the Contractor fail to comply with the requirements of this section.
 - b. No separate payment will be made to the Contractor for any of the requirements of this section. All such costs shall be part of the Contractor's planned project overhead costs included in its bid.

B. Performance Requirements:

1. The Baseline Project Schedule shall be the basis for evaluating the job progress and time extension requests. The responsibility for developing the Baseline Project Schedule, accurately updating the schedule, and monitoring the actual progress of the work compared to the planned schedule rests solely with the Contractor.
 - a. Failure of the Contractor to include any element of the work or any inaccuracy in the Baseline Project Schedule will not relieve Contractor from the responsibility for accomplishing all the work in accordance with the Contract requirements.
2. Inclement Weather: The Contractor shall have included all impacts to weather dependent activities, resulting from the anticipated Inclement Weather in the Baseline Project Schedule.
 - a. Contractor shall be responsible for all associated time delays and costs.
 - b. Contractor shall be responsible to account for associated mitigating measures which includes, but not limited to, dewatering, mucking, temporary weather protection, gravel roadways, equipment downtime, etc.
 - c. Contractor shall be responsible to account for the site's soil conditions, drainage patterns, and other elements that may be affected.
3. Cost Correlation: The Initial Project Schedule and the Baseline Project Schedule shall be the basis for developing the Schedule of Values and the Work performed as of planned and actual dates used for preparation of The Application for Payment Requests.
 - a. Refer to Specification Section - SCHEDULE OF VALUES.

4. Early Completion Schedules: Early completion schedules may be prohibited due to certain physical or monetary constraints imposed upon the Owner.
 - a. If not prohibited, and is contemplated by the Contractor as part of its bidding strategy, it is hereby expressly understood by the Contractor that early completion schedules will only be acceptable under the condition that the schedule be reasonable and realistic.
 - b. The Contractor certifies that it has included general conditions costs in its bid sufficient for the entire contractual time of performance.
 - c. No damages for delay will be recoverable if the project is prolonged beyond the early completion date, but still completed within the entire contract duration.

1.6 QUALITY ASSURANCE

- A. Qualifications:
 1. The Contractor must have the capacity and capability of supporting the project by producing schedule-related data within two (2) days of request by the Contractor, Architect, or Owner.
- B. Regulatory Requirements:
 1. In accordance with Specification Section - REGULATORY REQUIREMENTS.
- C. Meetings:
 1. Prescheduling Conference: Scheduled by the Contractor prior to submitting the Baseline Project Schedule, unless otherwise agreed to by the Architect and Owner, for the proper coordination of the work. Conduct conference at Project site. Review methods and procedures related to the Baseline Project Schedule, including, but not limited to, the following:
 - a. Discuss constraints, including phasing, work stages, interim milestones and partial Owner occupancy.
 - b. Review delivery dates for Owner-Furnished products.
 - c. Review schedule for work of Owner's separate contracts.
 - d. Review submittal requirements and procedures.
 - e. Review time required for review of submittals and resubmittals.
 - f. Review requirements for test and inspections by independent testing and inspection agencies.
 - g. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
 - h. Review and finalize list of construction activities to be included in schedule.
 - i. Review procedures for updating schedule.
 2. Progress Meetings: Scheduled by the Contractor for the proper coordination of the work.
 - a. Weekly Progress Meeting: Schedule on a weekly basis, unless otherwise agreed to by the Architect and Owner;
 - 1) Review Short Interval Schedule.
 - 2) Discuss field observations, problems, and decisions.
 - b. Monthly Schedule Update: Designate a regular monthly meeting to address and resolve all schedule issues for the prior month;
 - 1) Identification of any potential problems which may impede planned progress.
 - 2) Corrective measures to regain projected schedules.
 3. Participants (or designated representative) invited to attend each of the above meetings shall be as follows:

- a. Contractor.
- b. Owner.
- c. Architect.
- d. Project Inspector.
- e. Installer(s), as appropriate.
- f. Material Manufacturer(s), as appropriate.
- g. Subcontractors, as appropriate (including any accessory subcontractors).

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Time Frame: Extend schedules from dates established from the Notice to Proceed to final completion.
 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date.
- B. Activity Data: Schedule to show early start, early finish, late start, late finish, original duration, remaining duration, total float and percentage completion.
 1. Contractor shall submit a detailed BPS presenting an orderly and realistic plan for the completion of the entire project.
 - a. The BPS shall not show more than 10% of the total activities as critical.
 - b. The BPS shall not show more than 20% of the activities with total float of 10 working days or less.
 - c. The schedule shall not show any activities with negative float.
 - d. Start and Finish constraints, unless identified in the contract documents, shall be minimized as much as possible.
 2. Schedule activities that are dependent on submittal approval and/or material delivery. Activities shall not be scheduled to start earlier than the reasonably expected review, and acceptance or delivery dates.
 - a. Coordinate Submittal Schedule with the list of subcontractors, and the list of products.
 - b. Prepare the schedule in chronological order. Provide information as called for in Specification Section - SUBMITTAL PROCEDURES.
 - c. Submittal Review Time: Include review and resubmittal times indicated in Specification Section - SUBMITTAL PROCEEDURES in schedule.
- C. Activity Duration: Activity durations shall be the total number of days required to perform that activity.
 1. Define activities so no activity is longer that twenty (20) days, unless specifically allowed by Architect, except for submittal, approval, fabrication and delivery (procurement) activities
 2. Activities that require three months or longer to complete, indicate an estimated completion percentage in ten (10) percent increments within the time bar.
 3. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than sixty (60) days, as separate activities in schedule.
 - a. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery
 4. Startup and Testing Time: Include no fewer that fifteen (15) days for startup and testing.

5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 6. Punch List and Final Completion: Include not more than thirty (30) days for completion of punch list items and final completion.
- D. Constraints:
1. Constraints: Include constraints and work restriction indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 - a. Phasing: Arrange list of activities on schedule by phase as indicated in Specification Section – SUMMARY OF WORK
 - b. Include a Separate activity for each of the following:
 - 1) Work under More Than One Contract.
 - 2) Work Performed By Owner.
 - 3) Each Product Ordered In Advance, include delivery dates.
 - 4) Each Owner-Furnished Product, include the delivery dates.
 - c. Work Restrictions: Show the effect of the following items on the schedule:
 - 1) Coordination with existing construction.
 - 2) Limitations of continued occupancies.
 - 3) Uninterruptible service.
 - 4) Partial occupancy before Substantial Completion.
 - 5) Use of premises restrictions.
 - 6) Provisions for future construction.
 - 7) Seasonal variations.
 - 8) Environmental control.
 - d. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - 1) Submittals.
 - 2) Purchases.
 - 3) Mockups
 - 4) Fabrication
 - 5) Sample Testing.
 - 6) Deliveries
 - 7) Installation
 - 8) Test and inspections
 - e. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities.
- E. Inclement Weather: The schedules shall include delays due to the effect of the anticipated Inclement Weather, including resultant muddy conditions, in all-weather dependent activities.
1. The Contractor shall submit with the Baseline Project Schedule, a National Oceanic and Atmospheric Administration (NOAA) Meteorological Data Chart showing the "Normals", "Means" and "Extremes" of monthly Temperature, Precipitation, and Fog for the area where the project is located.
 - a. The Owner reserves the right to update Meteorological Data, so that it reflects the most accurate data for the project site, site conditions and locality.
 2. Upon review and acceptance, the Meteorological Data Chart shall be the baseline for evaluating anticipated weather related delays. Refer to the "sample" Meteorological Data Chart provided herein.

- a. Provide the number of delay days of anticipated Inclement Weather in the schedule per month.
- b. Provide the number of delay days of anticipated Mud Days in the schedule per month.
 - 1) Not all Mud Days are eligible for delays, only a portion of the actual Mud Days will be considered.
 - 2) Mud Days shall be based on a percentage of actual precipitation days. Upon review and found acceptable, the percentage shall be applied to actual precipitation that are above and beyond the anticipated Inclement Weather.
 - 3) It is the Contractors obligation to become aware of the site soil conditions, drainage patterns, and other elements that may affect the resulting impacts due to Mud Provide.

F. Project Information:

1. Identification: Include the following Project Identification on all Project Construction Schedules, Coordination Schedules, Schedule Modifications and Time Extension Requests.
 - a. Project Name and Location.
 - b. Name of Owner and Address.
 - c. Name of Architect and Address.
 - d. Architect's Project Number.
 - e. Contractor's Name and Address.
 - f. Submittal Date.

2.2 INITIAL PROJECT SCHEDULE (IPS)

A. Format:

1. Prepare in form of a summary level horizontal-box-column Bar-Chart Schedule:
 - a. Provide and identify separate columns to indicate the following:
 - 1) SPECIFICATION SECTION.
 - 2) DESCRIPTION.
 - 3) RESPONSIBILITY CODE.
 - 4) HORIZONTAL TIME SCALE.
 - b. Provide and identify separate activity line-item horizontal bars to indicate the following:
 - 1) Activity.
 - 2) Milestones.
 - 3) Contract Conditions.

B. Content:

1. SPECIFICATION SECTION: Use the specification section number in the Project Manual Table of Contents to identify and establish each line-item.
2. DESCRIPTION: Provide a description of the work for each line-item associated with the specification section and responsible party.
3. RESPONSIBILITY CODE: Provide responsibility code that identifies the responsible party for performing the work of each activity line-item associated with the specification section and description.
4. HORIZONTAL TIME SCALE: Identify the week, month and year. Indicate the first work day of each week with a continuous vertical line.
 - a. Extend from the date established from the Notice to Proceed to the date of Final Completion.

5. Activity: Provide a summary level bar chart with distinct graphic delineation for each activity line-item.
 - a. Provide at least one activity line-item for the work in each Specification Section.
 - 1) Provide separate activity line items for each Contractor or Subcontractor providing work under the same specification section.
 - b. Organize activities in chronological order by the beginning of each Activity.
6. Milestones: Include initial milestones with dates for the Notice to Proceed, Project Start, Substantial Completion, and Final Completion.
7. Contract Conditions:
 - a. Identify and provide separate activity line-items that are directly related to Division 01 - GENERAL REQUIREMENTS.
 - b. Identify and provide separate activity line-items that are directly related to Division 00 - CONDITIONS OF THE CONTRACT.

2.3 BASELINE PROJECT SCHEDULE (BPS)

A. Format:

1. Provide a comprehensive, fully developed, detailed, and complete horizontal Gantt-Chart type schedule based on the Initial Project Schedule.
 - a. Provide and identify separate columns to indicate the following:
 - 1) ACTIVITY CODE.
 - 2) SPECIFICATION SECTION.
 - 3) DESCRIPTION.
 - 4) RESPONSIBLE CODE.
 - 5) HORIZONTAL TIME SCALE.
 - b. Provide and identify separate line-item horizontal bars to indicate the following:
 - 1) Activity
 - 2) Sub-Schedules
 - 3) Milestones
 - 4) Contract Conditions

B. Content:

1. ACTIVITY CODE: Assign Activity Codes that identifies each separate activity line-item to allow the following, but not limited to, to be appropriately sort and grouped into Sub-Schedules, Major Areas of Work, and Reports:
 - a. "construction area," "trade" or "submittal/procurement".
2. SPECIFICATION SECTIONS: As described in the Initial Project Schedule.
3. RESPONSIBLE CODE: As described in the Initial Project Schedule.
4. HORIZONTAL TIME SCALE: As described in the Initial Project Schedule.
5. Activity: As describe in the Initial Project Schedule and expand to provide a detailed level bar chart with distinct graphic delineation for each activity line-item.
 - a. expand to include entities, which are responsible for performing the work of each activity, identified as, but not limited to General Contractor, and Sub-Contractor, second and tertiary tier Sub-Contractors, manufactures, fabricators and vendors.
 - b. Include activities for planned mobilization and sequence of early operations
6. Sub-Schedules: Sub-Schedules shall include, but not be limited to, the following:
 - a. Major Scope of Work: Identify each major area of construction for each major portion of the Work.
 - 1) Include, but not limited to, the following: Phasing, Alternates, Construction Phases and funding Criteria.

- b. Scope Type: Identify each major area of construction for each major portion of the Work, such as:
 - 1) Site Utilities
 - 2) Site Development Zones
 - 3) Buildings.
 - a) If necessary, separate each floor or separate areas of each main elements of the work.
 - c. Submittals: Include a separate sub-schedule for all submittal, approval and procurement activities, including owner-furnished items.
 - 1) Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - d. Testing and Inspection: Include a separate sub-schedule for all required on-site testing, off-site testing, mock-ups, and inspections.
7. Milestones: As describe in the Initial Project Schedule and include other milestones indicated in the Contract Documents and the following interim milestones.
- a. Earthwork.
 - b. Building Foundations and slab on grade.
 - c. Structural completions.
 - d. Partial Occupancy before Substantial Completion.
 - e. Temporary Enclosure and Space Conditioning.
 - f. Permanent Space enclosure.
 - g. Completion of Mechanical.
 - h. Completion of Electrical Installation.
 - i. Completion of Communication Installation.
 - j. Substantial Completion
 - k. Final Completion
8. Contract Conditions: As described in the Initial Project Schedule and expanded to include separate activity line-items that are directly related to Division 01 - General Requirements and are not of actual work-in-place. Such items shall be, but not limited to the following.
- a. Temporary Facilities.
 - b. Field Engineering.
 - c. Project Closeout Requirements:
 - 1) Startup and Testing Time:
 - 2) Operation and Maintenance.
 - 3) Demonstration and Training.
 - 4) Punch List.

PART 3 - EXECUTION

3.1 SCHEDULES AND PROCEDURES FOR CONSTRUCTION SCHEDULES

- A. General Requirements:
 - 1. The Architect may request the Contractor to provide (at no cost) the following additional reports or schedule plots:
 - a. Total or Free Float Report from least to most float.
 - b. Subcontractor Certifications, indicating approval of the subcontractors scheduled work, acknowledging outside factors such as manpower resources, stacking of trades, multiple mobilizations, and coordination of space with other trades and the stacking of trades.

- c. Narrative Reports: May include but not limited to the following descriptions;
 - 1) Last month's progress achieved, and anticipated next month's progress.
 - 2) Problems or delays experienced and an explanation of mitigating actions taken.
 - 3) Current or anticipated delays and proposed mitigation action to be taken.
 - 4) Listing of all submittals, RFIs, Change Directives, Owner-supplied equipment or other Owner-controlled and critical constraints affecting the Contractor's progress.

B. Coordination Schedules:

- 1. Short Interval Schedules (SIS): A look-ahead schedule.
 - a. Provide a three-week snapshot of the work generated from the most recent monthly Schedule Update.
 - b. Include the current week, and two week thereafter.
 - c. The schedule shall contain sufficient detail to evaluate inspection requirements, and for the Contractor to anticipate manpower and equipment needs.
- 2. Monthly Schedule Updates (MSU): Accurately indicate the actual progress of the work during the prior month.
 - a. Indicate the date through which progress is reported shall be identified on all update schedule.
 - 1) Provide the actual start and finish dates of activities commenced or completed during the prior month.
 - 2) Once the actual start and finish dates are updated and accepted as accurate, this data shall not be changed. This portion shall be considered an "As-Built".
 - 3) If the schedule data is changed due to a routine updating only, no identification or discussion of such changes is required.
 - b. The Monthly Schedule Updates shall include the Schedule Modifications and Time Extensions that have been mutual agreed to by the Architect and Contractor.
 - 1) In the event of multiple Schedule Modifications and Time Extensions, events shall be updated into the current Monthly Schedule Update in the actual order of occurrence.
 - c. The Architect's review comments shall be incorporated into the next update for the Architect's verification.

C. Schedule Modifications:

- 1. Changes in Sequence:
 - a. If the Architect determines that the sequence of the construction differs significantly from the Contract schedule, the Contractor shall submit a revised schedule for approval within fourteen (14) days of the Architect's request.
 - b. If the work is re-sequenced, or if activities are added or deleted, these schedule data changes must be specifically identified, discussed and submitted.
 - 1) The submittal shall be separate and apart from the routine monthly update submittals.
 - c. If the changes are reviewed and found acceptable, the schedule revision shall be made and incorporated into the project schedule prior to the next Monthly Schedule Update submittal.
 - 1) The Contractor agrees to be bound by the revised, re-sequenced or optimized schedules, and agrees to make no claim for such.
- 2. Recovery Schedule:

- a. When periodic update indicates, the Work is fourteen (14) or more calendar days behind the current approved schedule, submit a separate recovery schedule indication means by which Contractor intends to regain compliance with the schedule.
 - b. Submittal shall indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
 - 1) The submittal shall be separate and apart from routine monthly update submittals.
 - c. The Contractor agrees to be bound by the revised, re-sequenced or optimized schedules, and agrees to make no claim for such.
3. Alterations to Schedule:
- a. If the Contractor intends to alter its planned sequence or approach to the work, the Contractor shall submit a request of the schedule revisions or sequence changes to the Architect for review and comment.
 - b. Submittal shall include a description of the reason(s) for the schedule changes, a description of the changes being made, a list of all added and deleted activities, changed logic relationships, changed activity durations or descriptions, etc.
 - 1) The submittal shall be separate and apart from routine monthly update submittals.
 - c. If the requested changes are reviewed and found acceptable, the schedule revision shall be made and incorporated into the project schedule prior to the next Monthly Schedule Update submittal.
 - 1) The Contractor agrees to be bound by the revised, re-sequenced or optimized schedules, and agrees to make no claim for such.
- D. Time Extension Submittals:
- 1. Notice of Delay:
 - a. Provide "Notice of Delay" submittal to the Architect for all claimed time extension requests, showing the impact of the delay event on the Project Schedule. Refer to the "sample" "Notice of Delay" form provided herein.
 - 1) Submit as a Change Order Request (COR) in response to an event, SI, RFI, RFP, or other documents issued by the Architect.
 - 2) In cases where the Contractor does not provide "Notice of Delay" submittal for a delay event within the specified time limits, then it is mutually agreed that the delay event has no time impact on the contract completion date (or interim milestones) and no time extension is required
 - b. The Submittal shall demonstrate the time impact based on the date(s) and durations of the delay event, the status of construction at that point in time, and the affect on the scheduled sequence, progress of the Critical Path Activities and Project Completion.
 - 1) The Submittal shall be based on the latest Monthly Schedule Update.
 - 2) The Submittal shall include all supporting project documentation or delay calculations that establish entitlement and quantify the delay.
 - 3) The Submittal shall demonstrate the activity or activities effects on the total float along the activity path at the time the event occurred.
 - 4) The Contractor must propose possible mitigation plans (sequence changes and any costs) for otherwise critical path delays.
 - a) The Contractor shall provide an evaluation of the cost of mitigation versus the cost of extended project performance.

- c. If the requested changes are reviewed and found acceptable, the schedule revision shall be made and incorporated into the project schedule prior to the next Monthly Schedule Update submittal.
 - 1) Extensions of time for performance will be granted only to the extent that the equitable time adjustment for the activity or activities affected exceeds the total float.
 - 2) The Contractor acknowledges and agrees that mitigation of delays due to delay events may require a change to preferential sequences of work.
 - a) The Contractor agrees to be bound by the revised, re-sequenced or optimized schedules, and agrees to make no claim for such.
 - d. The Owner (or District) shall not be liable for any acceleration costs due to the Contractor's failure to comply with the contract requirements for requesting, documenting and demonstrating that a time extension is required for a delay event.
 - 1) The Contractor's obligation to timely perform per the schedule will not be excused until time extension requests are reviewed and accepted by the Architect.
2. Inclement Weather Delays:
- a. General:
 - 1) The Contractor shall record on the Contractor Daily Reports, each occurrence of Inclement Weather and Mud impacts to the progress of scheduled work through the Contract duration.
 - a) Inclement Weather days will be counted chronologically from the first to the last day of each month, with each daily incidence of "Inclement Weather" being counted as a whole day.
 - b) Each occurrence of Inclement Weather and Mud, must be verified and approved by the Inspector of Record.
 - b. Unusually Severe Weather:
 - 1) Provide "Unusually Severe Weather" submittal to the Architect for all claimed time extension requests, showing the impact of the delay event on the contract schedule. Refer to the "sample" "Notice of Unusually Severe Weather" form provided herein.
 - 2) Submit as a Change Order Request (COR).
 - 3) The submittal shall demonstrate the time impact based on the date(s) and durations of the delay event, the status of construction at that point in time, and the effect on the scheduled sequence and progress of the Critical Path Activities.
 - a) The submittal shall be based on the latest Monthly Schedule Update.
 - b) The submittal shall include all supporting project documentation or delay calculations that establish entitlement and quantify the number of days of anticipated "Inclement Weather" are exceeded in a given month.
 - c) The submittal shall demonstrate the effects on the total float of the Project at the time the event occurred
 - d) The submittal shall demonstrate that the delay must be beyond the control and without the fault of negligence of the Contractor
 - 4) If the requested changes are reviewed and found acceptable, the schedule revision shall be made and incorporated into the project schedule prior to the next Monthly Schedule Update submittal.
 - a) The Contractor will become eligible for an excusable, non-compensable time extension for "Unusually Severe Weather".
 - c. Mud Days:

- 1) Provide "Mud Days" Submittal to the Architect for all claimed time extension requests, showing the impact of the delay event on the contract schedule. Refer to the "sample" "Notice of Mud Days" form provided herein
- 2) Submit as a Change Order Request (COR).
- 3) The Submittal shall demonstrate the time impact based on the date(s) and durations of the delay event, the status of construction at that point in time, and the effect on the scheduled sequence and progress of the Critical Path Activities.
 - a) The Submittal shall be based on the latest Monthly Schedule Update.
 - b) The Submittal shall include all supporting project documentation or delay calculations that establish entitlement and quantify the number of days of anticipated "Mud Days" are exceeded in a given month.
 - c) The Submittal shall demonstrate the effects on the total float of the Project at the time the event occurred.
 - d) The Submittal shall demonstrate that the delay must be beyond the control and without the fault of negligence of the Contractor.
- 4) If the requested changes are reviewed and found acceptable, the schedule revision shall be made and incorporated into the project schedule prior to the next Monthly Schedule Update Submittal.
 - a) The Contractor will become eligible for an excusable, non-compensable time extension for "Mud Days".

3.2 SCHEDULES

- A. List of attached Forms and Reports.
 1. Meteorological Data Chart.
 2. Notice of Delay Form.
 3. Inclement Weather Form.

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EXAMPLE• Meteorological Data for Fresno, California Normals, Means and Extremes							
TEMPERATURE (degrees F)					PRECIPITATION***		FOG
Month	Normal		Extremes		Mean* Number Calendar / Work	Normal (in)	Mean** Number Calendar / Work
	Daily Max.	Daily Min.	Record Highest	Record Lowest			
					Days per Month		Days per Month
Jan	54.1	37.4	78	19	7.5/5.4	1.96	11.8/8.4
Feb	61.7	40.5	80	24	7.1/5.1	1.8	6.0/4.3
Mar	66.6	43.4	90	26	7.1/5.1	1.89	1.7/1.2
Apr	75.1	47.3	100	32	4.1/2.9	0.97	0.3/0.2
May	84.2	53.7	107	36	1.9/1.4	0.3	0.1/0.1
Jun	92.7	60.4	110	44	0.7/0.5	0.08	0.0/0.0
Jul	98.6	65.1	112	50	0.2/0.1	0.01	0.0/0.0
Aug	96.7	63.8	111	49	0.3/0.2	0.03	0.1/0.1
Sep	90.1	58.8	111	37	1.0/0.7	0.24	0.1/0.1
Oct	79.7	50.7	102	27	2.2/1.6	0.53	0.9/0.6
Nov	64.7	42.5	89	26	5.2/3.7	1.37	5.8/4.1
Dec	53.7	37.1	76	18	6.7/4.8	1.42	12.1/8.6
Year					44.1/31.5	10.6	38.8/27.7
Source: NOAA, National Oceanic and Atmosphere Administration.							
* Precipitation of 0.01 inches or more.							
** Heavy Fog visibility 1/4 mile or less.							
*** Refer to the term Mud, for mud impacts.							
Above data is subject to change, based upon the locality of the project. Contractor shall assemble the data and submit to The Architect for confirmation, review and modifications: Obtain data from NOAA (828) 271-4800, or the Local Weather Office. http://www.ncdc.noaa.gov							

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NOTICE OF DELAY FORM

Date: _____ Submittal No.: _____

From: Name of Contractor Sheet _____ of _____

To: Darden Architects, 6790 N. West Avenue, Fresno, CA 93711 (559) 448-8051

Description of Delay: By reference to attached schedule, the following delay occurred:

Continued on Sheets ____ of ____

Time Extension Requested: _____ work days x 1.4 = _____ calendar days.

Time Requested for Activity: _____ Time Requested for Project: _____

Related Documents: The following construction documents provide evidence of the delay event:

RFI Nos.: _____ SI Nos.: _____

CCD Nos.: _____ RFP Nos.: _____

Daily Reports Dated: _____ and attached.

Project Correspondence Dated: _____ and attached.

Other Documentation: _____

Schedule-Related Information: By reference to the attached Schedule, provide the following:

Predecessor Activity: _____

Successor Activity: _____

Affected CPM Schedule Activities (list IDs and descriptions):

- THE REST OF THIS PAGE IS INTENTIONALLY BLANK -

INCLEMENT WEATHER FORM

Date: _____

From: Name of Contractor Sheet _____ of _____

To: Darden Architects, 6790 N. West Avenue, Fresno, CA 93711 (559) 448-8051

Description of Delay: the following delay occurred:

Continued on Sheets ____ of ____

Time Extension Requested: _____ work days x 1.4 = _____ calendar days.

Time Requested for Activity: _____ Time Requested for Project: _____

Related Documents: The following construction documents provide evidence of the delay event:

Daily Reports Dated: _____ and attached.

Project Correspondence Dated: _____ and attached.

Other Documentation: _____

Affected CPM Schedule Activities (list IDs and descriptions):

END OF SECTION

SECTION 013226 – FORMS AND REPORTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Contractor to provide all Forms and Reports as required by the Architect for Administrative Procedures and other related items necessary to document the Project as required by the Contract Documents, including but not limited to those forms provided under this specification section.
 2. CalGREEN Forms:
 - a. Contractor shall provide all California Green Building Standards Code Certification Worksheets and other related items necessary to document the Project as required by the AHJ, including, but not limited to, those forms provided under this specification section.
 - 1) Obtain the latest documents from the California Building Standards Commission; revisions may have been made since the publication of this Project Manual.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Forms and Reports as attached to this section when required by the Architect.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULES

- | A. | Listing of Architect required Forms and Reports | No. of Pages: |
|-----|--|---------------|
| 1. | 01 32 26.01-DAILY SUPERINTENDENT'S REPORT | 2 |
| 2. | 01 32 26.02-SUBCONTRACTOR'S DAILY REPORT | 1 |
| 3. | 01 32 26.03-SHOP DRAWING AND SUBMITTAL TRANSMITTAL | 1 |
| 4. | 01 32 26.04-REQUEST FOR INFORMATION (RFI) | 1 |
| 5. | 01 32 26.05-SUPPLEMENTAL INSTRUCTIONS (SI) | 1 |
| 6. | 01 32 26.06-REQUEST FOR PROPOSAL (RFP) | 1 |
| 7. | 01 32 26.07-CONSTRUCTION CHANGE DIRECTIVE (CCD) | 1 |
| 8. | 01 32 26.08-CHANGE ORDER REQUEST REVIEW (COR) | 2 |
| | a. (Review form provided by the Contractor is subject to review and comments by the Owner and Architect). | |
| 9. | 01 32 26.09-CHANGE ORDER (CO) | 1 |
| 10. | 01 32 26.10-FRAGNET SUBMITTAL FORM | 1 |
| 11. | 01 32 26.11-APPLICATION FOR PAYMENT (AP) | 1 |
| 12. | 01 32 26.12-CONTRACTOR'S TESTING / INSPECTION REQUEST FORM | 1 |
| 13. | 01 32 26.13-CONTRACTOR'S "DEVIATION NOTICE" INSPECTION REPORT FORM | 1 |
| 14. | 01 32 26.14-CONTRACTOR'S FINAL INSPECTION REQUEST FORM | 1 |
| 15. | 01 32 26.15-CONTRACTOR'S PUNCHLIST INSPECTION REQUEST FORM | 1 |
| 16. | 01 32 26.16-CONTRACTOR'S PUNCHLIST | 1 |
| 17. | Periodic field reports issued by the Architect and Engineers. | |
| 18. | Contractor's Punch List Response and Correction form is required for each Punch List Review report, citing the issuing Punch List Review format number(s). | |
| 19. | Completed Contractor's Punch List and Final Inspection Reports issued by the Architect, Engineers and the Owner. | |
| 20. | See the attached Forms and Reports suitable for reproduction by the Contractor or Subcontractor. | |
| | | |
| B. | Listing of California Green Building Standards Code Certification Worksheets: | |
| 1. | WORKSHEET (WS-1) BASELINE WATER USE. | |
| 2. | WORKSHEET (WS-2) WATER USE REDUCTION. | |
| 3. | CONSTRUCTION WASTE MANAGEMENT (CWM) PLAN (Sample). | |
| 4. | CONSTRUCTION WASTE MANAGEMENT (CWM) WORKSHEET (Sample). | |
| 5. | CONSTRUCTION WASTE MANAGEMENT (CWM) ACKNOWLEDGMENT (Sample). | |

END OF SECTION

(Attachments)

**GENERAL CONTRACTOR'S
DAILY SUPERINTENDENT'S REPORT**

(JOB NO./REPORT NO.)

(DATE/DAY)

(JOB NAME)

WEATHER DESCRIPTION

(WORK SHIFT) / FROM / TO

(PROJECT MANAGER/SUPERINTENDENT)

PM/ SUPT	ENGR/ TK	CARPENTERS			LABORERS		CEM FINISHERS			OPER ENGR		OTHER	TOTAL
		FMAN	JRMAN	APP	FMAN	LAB	FMAN	JRMAN	APP	JRMAN	APP		

CONCRETE: _____ CY TODAY: _____ LOCATION: _____ CY TO DATE: _____

WORK SUMMARY:

DELAYS / WORK RELEASED BY OWNER:

CHANGE ORDERS / EXTRA WORK ORDERS:

INSTRUCTIONS FROM ARCHITECT / OWNER:

MATERIALS / EQUIP. DELIVERED TO JOB:

INSPECTIONS / TESTS PERFORMED

SAFETY / ACCIDENTS:

MAJOR EQUIP. ON SITE:

BACKSIDE OF GENERAL CONTRACTOR'S REPORT

SUBCONTRACTORS ON JOB	NO. OF MEN	FOREMAN'S NAME	WORK DESCRIPTION / LOCATION

MAJOR EQUIPMENT ON SITE:

BACK CHARGES:

REMARKS:

**SUBCONTRACTOR'S
DAILY REPORT**

PROJECT:

DATE:

SHIFT TIME

FOREMAN:

WEATHER:

WORK DESCRIPTION AND LOCATION:

SUB-SUBCONTRACTOR	CREW SIZE	CRAFT	WORK DESCRIPTION / LOCATION

DELAYS:

CHANGE ORDERS / EXTRA WORK ORDERS:

INSTRUCTIONS RECEIVED FROM GC:	TESTS / INSPECTIONS PERFORMED:
MATERIAL / EQUIPMENT DELIVERIES:	MAJOR EQUIPMENT ON SITE:

SAFETY / ACCIDENTS:

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SHOP DRAWING AND SUBMITTAL TRANSMITTAL

DESCRIPTION:

SUBMITTAL NO.:

SPEC SECTION:

ARCHITECT:

Darden Architects

6790 N. West Ave
Fresno, California 93711

PROJECT:

CONTRACTOR:

SUPPLIER:

Substitution: Yes: **DSA Approval Req'd**

DATE RECEIVED: _____ **NO. RECEIVED:** _____ **DATE RETURNED:** _____

Contractor Remarks:

Other Required Information:

CPM Activity / Submittal Task No.: _____

Early Start (ES) Date: _____

Late Finish (LF) Date: _____

WARRANTY: **O and M MANUALS**

Early Finish (EF) Date: _____

Scheduled Float Time: _____ **0**

DESIGN CONSULTANT'S REVIEW:

TRANSMITTED BY ARCHITECT TO: _____ DATE RETURNED: _____

DATE SENT: _____

NO. SENT: _____

Consultants Remarks:

ACTION:

- NO EXCEPTION TAKEN RELATIVE TO DESIGN
- NO EXCEPTION TAKEN WITH MODIFICATION NOTED
- AMEND AS NOTED AND RESUBMIT
- REJECTED AND RESUBMIT
- SEE ATTACHED LETTER

ARCHITECT'S REVIEW:

Architects Remarks:

ACTION:

- NO EXCEPTION TAKEN RELATIVE TO DESIGN
- NO EXCEPTION TAKEN WITH MODIFICATION NOTED
- AMEND AS NOTED AND RESUBMIT
- REJECTED AND RESUBMIT

Approved Substitution

COPIES TO:

DATE RETURNED: _____

Contractor:

Owner:

Inspector:

File:

Other:

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6790 N. West Avenue
Fresno, California 93711
Tel: 559.448.8051
Fax: 559.446.1765

www.dardenarchitects.com

REQUEST FOR INFORMATION

RFI No.:

To: Darden Architects
6790 N. West Ave
Fresno, California 93711

Date:
Respond By:

Attn:
DSA/OSHPD Review Yes No Apprd
Required

Architect Project No.
Project:

INFORMATION REQUESTED:

Cost Impact: _____ Signature: _____
Schedule Impact: _____ Days Pages Attached: _____
Trade/Contractor: _____ Schedule Task No/Item: _____

The Work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in the Contract Sum or Contract Time. Proceeding with the Work in accordance with these instructions indicates your acknowledgement that there will be no change in the Contract Sum or Contract Time.

If the Contractor considers that this supplemental instruction requires a change in the Contract Sum or Contract Time, the Contractor shall not proceed with this Work and shall promptly submit an itemized proposal to the Architect for doing this work. If your proposal is found to be satisfactory and in order, this supplemental instruction will be superseded by a Construction Change Directive.

Referred To: _____ Referred Date: _____ Return Date: _____

SUPPLEMENTAL INSTRUCTIONS:

Consultant : _____ Architect _____
Date: _____ Date _____

Copy: Owner Inspector Testing Lab Structural Mech. Elec File Other Pages Attached: _____

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6790 N. West Avenue
Fresno, California 93711
Tel: 559.448.8051
Fax: 559.446.1765

www.dardenarchitects.com

SUPPLEMENTAL INSTRUCTIONS

PROJECT:

SUPPL. INST. NO.:

OWNER:

DATE OF ISSUANCE:

CONTRACT DATE:

CONTRACTOR:

NOTICE TO PROCEED:

Architect Project No.:
DSA Appl. No.:
DSA File No.:
OPSC Appl. No.:
OSHPD No.:

The Work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in the Contract Sum or Contract Time. Proceeding with the Work in accordance with these instructions indicates your acknowledgement that there will be no change in the Contract Sum or Contract Time.

If the Contractor considers that this supplemental instruction requires a change in the Contract Sum or Contract Time, the Contractor shall not proceed with this Work and shall promptly submit an itemized proposal to the Architect for doing this work. If your proposal is found to be satisfactory and in order, this supplemental instruction will be superceded by a Construction Change Directive.

Description:

Trade/Contractor:
Attachments:

Schedule Task No/Item:

Darden Architects, Inc.

Issued By:

Architect

OWNER CONTRACTOR INSPECTOR TESTING LAB STRUCTURAL MECHANICAL ELECTRICAL OTHER

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6790 N. West Avenue
Fresno, California 93711
Tel: 559.448.8051
Fax: 559.446.1765

www.dardenarchitects.com

REQUEST FOR PROPOSAL

PROJECT:

REQUEST FOR PROPOSAL NO.:

OWNER:

DATE OF ISSUANCE:

CONTRACT DATE:

CONTRACTOR:

NOTICE TO PROCEED:

Architect Project No.:

DSA Appl. No.:

DSA File No.:

OPSC Appl. No.:

OSHPD No.:

Please submit an itemized proposal for change in the Contract Sum and Contract Time for proposed modifications to the Contract Documents described herein. Submit proposal promptly or notify the Architect in writing of the date on which you anticipate submitting your proposal.

This is not a Change Order, Construction Change Directive, or a direction to proceed with the Work described in the proposed modifications.

Description:

Attachments

Darden Architects, Inc.

ISSUED BY:

Architect

OWNER CONTRACTOR ARCHITECT CONSULTANT INSPECTOR OTHER

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CONSTRUCTION CHANGE DIRECTIVE

PROJECT:

DIRECTIVE NO.:

OWNER:

DATE OF ISSUANCE:

CONTRACTOR:

CONTRACT DATE:

NOTICE TO PROCEED:

Architect Project No.:

DSA Appl. No.:

DSA File No.:

OPSC Appl. No.:

OSHPD No.:

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

CONTRACT ADJUSTMENT

1. The proposed basis of adjustment to the Contract Sum or Guaranteed Maximum Price is:

- Lump Sum
- Unit Price of _____
- As provided for in General Conditions and the Supplemental Conditions of the contract.
- As Follows: _____

2. The Contract Time is proposed to _____ (be adjusted). The proposed adjustment, if any, is _____ increase of _____ days)

When signed by the Owner and Architect and received by the Contractor, this document becomes effective IMMEDIATELY as a Construction Change Directive (CCD), and the Contractor shall proceed with the change(s) described above.

Signature by the Contractor indicates the Contractor's agreement with the proposed adjustments in Contract Sum and Contract Time set forth in this Construction Change Directive.

ARCHITECT

OWNER

CONTRACTOR

Darden Architects

6790 N. West Ave

Fresno, California 93711

By: _____

By: _____

By: _____

Date: _____

Date: _____

Date: _____

OWNER

CONTRACTOR

ARCHITECT

CONSULTANT

INSPECTOR

OTHER

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6790 N. West Ave
Fresno, California 93711
Tel: 559.448.8051
Fax: 559.446.1765

CHANGE ORDER REQUEST REVIEW

www.dardenarchitects.com

PROJECT:

CHANGE ORDER REQUEST NO.:

DATE OF ISSUANCE:

OWNER:

Architect Project No.:

DSA Appl. No.:

CONTRACTOR:

DSA File No.:

OPSC Appl. No.:

OSHPD No.:

DESCRIPTION OF PROPOSED CHANGE:

Requested By:

Scope:

Necessary for:

DESIGN CONSULTANT'S REVIEW:

Date Sent:

ACTION:

Referred To:

Date Returned:

- NO EXCEPTION TAKEN RELATIVE TO COST
- NO EXCEPTION TAKEN RELATIVE TO TIME
- AMEND AS NOTED AND RESUBMIT
- REJECTED

Consultants Remarks

ARCHITECT'S REVIEW:

Date Returned:

ACTION:

Architects Remarks:

- NO EXCEPTION TAKEN RELATIVE TO COST
- NO EXCEPTION TAKEN RELATIVE TO TIME
- AMEND AS NOTED AND RESUBMIT
- REJECTED

Attachments:

REVIEWED:

Darden Architects
6790 N. West Ave
Fresno, California 93711

APPROVED:

Darden Architects :

Date :

Owner :

Date :

The Architect is hereby directed to instruct the Contractor to make the above changes in the Project and to include these changes in a subsequent Change Order:

- OWNER
- CONTRACTOR
- INSPECTOR
- STRUCTURAL
- MECHANICAL
- ELECTRICAL
- OTHER

CHANGE ORDER REQUEST NO.

Project Architect's Project No.:

CHANGE ORDER REQUEST- BREAKDOWN WORKSHEET

WORK DELETED:

Contractor			
Materials	\$0.00		
Equipment	\$0.00		
Labor	\$0.00		
Material, Equipment, & Labor		\$0.00	
TOTAL:			\$0.00

ADDITIONAL WORK PERFORMED BY SUB-CONTRACTOR

Sub-Contractor			
Materials	\$0.00		
Equipment	\$0.00		
Labor	\$0.00		
Material, Equipment, & Labor		\$0.00	
Overhead		\$0.00	
Profit		\$0.00	
Sub Total:			\$0.00
Contractor			
Overhead		\$0.00	
Profit		\$0.00	
TOTAL:			\$0.00

ADDITIONAL WORK PERFORMED BY CONTRACTOR

Contractor			
Materials	\$0.00		
Equipment	\$0.00		
Labor	\$0.00		
Material, Equipment, & Labor		\$0.00	
Overhead		\$0.00	
Profit		\$0.00	
TOTAL:			\$0.00

TOTAL COST: \$0.00

TOTAL COST: \$0.00

TOTAL DAYS: 0

ARCHITECTURAL ADMINISTRATIVE FEES:

Proposal Request Administration	\$0.00
Construction Administration	<u>\$0.00</u>
TOTAL:	\$0.00
DSA Fees:	<u>\$0.00</u>

CHANGE ORDER

PROJECT:

CHANGE ORDER NO.:

OWNER:

DATE OF ISSUANCE:

CONTRACT DATE:

CONTRACTOR:

NOTICE TO PROCEED:

Architect Project No.:
DSA Appl. No.:
DSA File No.:
OPSC Appl. No.:
OSHPD No.:

The Contract is changed as follows:

Description:

It is mutually agreed that the affixed signature to this Change Order is evidence that all compensation with respects to the changes defined herein have been satisfied with the execution of this document. Furthermore, no additional compensation either monetarily or via time extension to this contract will be sought in respect to this Change Order.

The Original Contract Sum and Contract Completion Date:

Net change (Contract Sum and Contract Time) by previous Change Orders: _____ days

Contract Sum and Contract Completion Date prior to this Change Order: _____

Contract Sum and Contract Time (increased or decreased) by this Change Order: _____ days

New Contract Sum and Contract Completion Date including this Change Order: _____

CONTRACTOR

ARCHITECT

OWNER

Darden Architects

6790 N. West Ave

Fresno, California 93711

By: _____ By: _____ By: _____

Date: _____ Date: _____ Date: _____

OWNER CONTRACTOR ARCHITECT CONSULTANT INSPECTOR OTHER

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FRAGNET SUBMITTAL FORM

Date: _____

Sheet _____ of _____

From: _____

Fragnet No.: _____

To: Darden Architects, Inc.

Description of Delay: By reference to attached schedule fragnet, the following delay occurred:

Continued on Sheets _____ of _____
Time Extension Requested: _____ wds, _____ cds.

Time Requested for Activity: _____ Time Requested for Project: _____

Related Documents: The following construction documents provide evidence of the delay event:

RFI Nos.: _____ SI Nos.: _____

CCD Nos.: _____ RFP Nos.: _____

Daily Reports Dated: _____ and attached.

Project Correspondence Dated: _____ and attached.

Other Documentation: _____

Schedule-Related Information: By reference to the attached fragnet, provide the following:

Predecessor Activity to Fragnet:

Successor Activity to Fragnet:

Affected CPM Schedule Activities (list IDs and descriptions):

New CPM Schedule Activities (list IDs and descriptions):

END OF FORM

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APPLICATION FOR PAYMENT

To: **DARDEN ARCHITECTS, INC.**
6790 N. West Avenue
Fresno, CA 93711

Project: _____
 Bid Package No. _____

Pay Application No.: _____

Application Date: _____

Period Ending: _____

Distribution to:
 Owner: _____
 Architect: _____
 Contractor: _____
 Const Mgr.: _____
 Inspector: _____

FROM _____
 Prime Contractor

Address: _____

Phone: _____

CONTRACTOR'S APPLICATION FOR PAYMENT

CHANGE ORDER SUMMARY

APPROVED CHANGE ORDERS:

Change Order No.:	Approved Date:	Amount:
		\$
		\$
		\$
		\$
		\$
		\$
		\$
		\$
		\$

TOTALS

Net change by Change Order	\$
----------------------------	----

The undersigned Contractor certifies that in the best of his knowledge, information, and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the contractor for work for which previous Certificates for Payment were issued and payment received from the Owner and that current payment show herein is now due.

Contractor:

DATE: _____

The present status of the account for this Contract is as follows:

ORIGINAL CONTRACT SUM	\$
Net Change by Change Orders	\$
CONTRACT SUM TO DATE:	\$
TOTAL COMPLETE & STORED TO DATE:	\$
RETAINAGE: _____ %:	\$
TOTAL EARNED LESS RETAINAGE:	\$
LESS STOP NOTICE(S):	\$
LESS PREVIOUS PAYMENT:	\$
CURRENT PAYMENT DUE:	\$

This Certificate is not negotiable. This AMOUNT CERTIFIED is payable only to the Contractor named herein, issuance, payment and acceptance of payment, are without prejudice to any rights of the Owner or Contractor under this contract.

CONTRACTOR:

DATE: _____

CONSTRUCTION MANAGER:

DATE: _____

INSPECTOR:

DATE: _____

ARCHITECT:

DATE: _____

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CONTRACTOR'S TESTING / INSPECTION REQUEST FORM

PROJECT: _____
DATE RECEIVED: _____ (by Inspector)
TIME RECEIVED: _____ (by Inspector)
BUILDING: _____
SITE/OFFSITE: _____
CONSTRUCTION PHASE (1, 2, 3, etc.): _____
SPECIFICATION SECTION (No.): _____
PLAN SHEET AND DETAIL: _____
SCOPE OF WORK: _____
(concrete, electrical, etc.)

INSPECTION REQUESTED BY: _____
(contractor name)

LOCATION (bldg., room, floor, wall, ceiling, etc.) _____

TYPE OF INSPECTION (concrete, framing, welding, masonry, electrical, etc.) _____

INSPECTION REQUESTED ON: _____ at _____ am/pm
(date) (time)

Note 1: A Minimum Notice of 48 hours is Required to be Received by the Inspection Officer Prior to the Time the Testing / Inspection is Requested to Begin.

PRINT NAME AND TITLE OF PERSON REQUESTING INSPECTION

SIGNATURE OF PERSON REQUESTING INSPECTION

Note 2: Contractor Must Accompany Inspector on Inspection, if Requested.

PASSED: _____ FAILED: _____

Note 3: See Attached Sheet for Explanation if Inspection Failed. Re-inspection Required.

INSPECTOR SIGNATURE: _____ Date: _____

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CONTRACTOR'S "DEVIATION NOTICE" INSPECTION REQUEST FORM

PROJECT: _____
DATE RECEIVED: _____ (by Inspector)
TIME RECEIVED: _____ (by Inspector)

DEVIATION NOTICE(S) (No.): _____

BUILDING: _____

SITE/OFFSITE: _____

CONSTRUCTION PHASE (1, 2, 3, etc.): _____

SPECIFICATION SECTION (No.): _____

SCOPE OF WORK: _____
(concrete, electrical, etc.)

INSPECTION REQUESTED BY: _____
(contractor company name)

LOCATION(S) OF WORK FOR INSPECTION (be specific- bldg.(s), room(s), etc.)

INSPECTION REQUESTED ON: _____ at _____ am/pm
(date) (time)

Note 1: A Minimum Notice of 48 hours is Required to be Received by the Inspection Officer Prior to the Time the "Deviation Notice" Inspection is Requested to Begin.

PRINT NAME OF PERSON REQUESTING DEVIATION NOTICE INSPECTION

SIGNATURE OF PERSON REQUESTING DEVIATION NOTICE INSPECTION

Note 2: Contractor Must Accompany Project Inspector on "Deviation Notice" Inspection, if Requested.

Note 3: See Attached "Deviation Notice" for Inspector's Comments and/or Date Completed.

PASSED: _____ FAILED: _____

PROJECT INSPECTOR SIGNATURE: _____
DATE: _____

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CONTRACTOR'S FINAL INSPECTION REQUEST FORM

PROJECT: _____
DATE RECEIVED: _____ (by Inspector)
TIME RECEIVED: _____ (by Inspector)

BUILDING: _____
SITE/OFFSITE: _____
CONSTRUCTION PHASE (1, 2, 3, etc.): _____
SPECIFICATION SECTION (No.): _____
SCOPE OF WORK: _____
(concrete, electrical, etc.)

INSPECTION REQUESTED BY: _____
(contractor company name)

INSPECTION REQUESTED ON: _____ at _____ am/pm
(date) (time)

Note 1: A Minimum Notice of 48 hours is Required to be Received by the Inspection Officer Prior to the Time the Final Inspection is Requested to Begin. Contractor to be Notified by the Construction Manager in Regards to the Actual Date and Time of the Final Inspection.

PRINT NAME AND TITLE OF PERSON REQUESTING FINAL INSPECTION

SIGNATURE OF PERSON REQUESTING FINAL INSPECTION

Note 2: Contractor Must Accompany Project Inspector, Architect and/or Engineer(s) on Final Inspection, if Requested.

PASSED: _____ FAILED: _____

Note 3: If the Final Inspection Fails Re-Inspection is Required. See Attached Sheet for Comment(s).

PROJECT INSPECTOR SIGNATURE: _____
DATE: _____

PROJECT ARCHITECT SIGNATURE: _____
DATE: _____

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CONTRACTOR'S PUNCHLIST INSPECTION REQUEST FORM

PROJECT: _____
DATE RECEIVED: _____ (by Inspector)
TIME RECEIVED: _____ (by Inspector)
BUILDING: _____
SITE/OFFSITE: _____
CONSTRUCTION PHASE (1, 2, 3, etc.): _____
SPECIFICATION SECTION (No.): _____
SCOPE OF WORK: _____
(concrete, electrical, etc.)

INSPECTION REQUESTED BY: _____
(contractor company name)

LOCATION(S) OF WORK FOR INSPECTION: (be specific- bldg.(s), room(s), etc.)

DESCRIPTION OF WORK TO BE INSPECTED: (item number(s) from punchlist)

INSPECTION REQUESTED ON: _____ at _____ am/pm
(date) (time)

Note 1: A Minimum Notice of 48 hours is Required to be Received by the Inspection Officer Prior to the Time the Punchlist Inspection is Requested to Begin.

PRINT NAME OF PERSON REQUESTING PUNCHLIST INSPECTION

SIGNATURE OF PERSON REQUESTING PUNCHLIST INSPECTION

Note 2: Contractor Must Accompany Project Inspector on Punchlist Inspection, if Requested. Items Must Have Already Been Signed Off by Contractor.

Note 3: Attached Sheet for Contractor's Signoff and/or Inspector's Comments and/or Date Completed for the Specific Punchlist Items Noted Above.

Note 4: This Inspection is NOT A FINAL INSPECTION but Only an Acknowledgement That a Particular Item(s) is/are completed.

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PROJECT: _____ - CONTRACTOR'S PUNCLIST
 CONTRACTOR NAME: _____ Page _____ of _____

ITEM NO.	DESCRIPTION	BUILDING & ROOM NO.	FLOOR	CEILING	WALLS				DATE OBSERVED	SIGNOFF/ COMMENTS
					N.	S.	E.	W.		

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SECTION 013300 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely provide all required submittals and other related items necessary to complete the Project as indicated by the Contract Documents.

- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

- A. Request for Electronic Files:
 - 1. Submit in accordance with the following:
 - a. Contractor's Usage Agreement for Electronic Files:
 - 1) See attachment.

- B. Contractor's responsibilities:
 - 1. The Contractor shall check, verify, and be responsible for all field measurements.
 - 2. The Contractor shall submit a schedule indicating when the required shop drawings and submittals will be submitted to the Architect.
 - a. Submit schedule within the amount of days as indicated in Specification Section - CONSTRUCTION SCHEDULES.
 - 3. Submit copies as scheduled below, checked and approved by the Contractor for all submittals required for the work of the various trades. Deliver submittals promptly to avoid delays in delivery of materials or execution of the work.
 - a. The Contractor (or Subcontractor) shall mark-up the submittals as to project specifics. If the specifications contains a schedule prepared by the Architect (i.e. paint symbols such as DW-1, M-1, CB-1, etc., or tile symbols such as CT-1,CT-2, or IWA, IWB, IWC, etc.), then the submittal will also contain those designations. Submittals without project specifics will be returned to the Contractor as not being properly prepared.
 - b. The Contractor shall stamp the Submittals utilizing any language requested by the Owner in the General Conditions and the following minimum language:

"This submittal has been reviewed by (Name of Contractor) and approved with respect to the means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs

incidental thereto. The Contractor has reviewed and approved not only the field dimensions, but the construction criteria, and has also made written notation regarding any information in the Shop Drawings that does not conform to the Contract Documents. The Contractor has reviewed this submittal and coordinated with all other Shop Drawings received to date by the Contractor and this duty of coordination has not been delegated to subcontractors, material suppliers, the Architect, or the design consultants on this project. The Contractor shall also have indicated that it has not relied upon the dimensions shown on the drawings, specifications and schedules, and that the Contractor has double-checked all dimensions for accuracy and fit. (Name of Contractor) also warrants that this submittal complies with the Contract Documents and comprises no variation thereto."

By: _____ Contractor's Signature

_____ Contractor's Typed Name

Date: _____

- c. Substitutions on shop drawings or in product submittals will not be considered without prior approval in accordance with Specification Section - SUBSTITUTION PROCEDURES. Submittals containing unacceptable items will be rejected.
- d. The Contractor shall make any corrections required by the Architect during the Architect's initial review, and re-submit the required corrected copies for final review and distribution.

C. Architect's responsibilities:

1. The Architect will make any desired corrections with reasonable promptness, and return the submittal to the Contractor.
2. The Architect's review of such drawings or schedules shall not relieve the Contractor of responsibility for deviations from the drawings or specifications, unless he has, in writing, called the Architect's attention to such deviations at the time of submission, and secured written acceptance.
 - a. The Architect's review shall be for general conformance with the design concept for the project and general compliance with the information given in the Contract Documents.
 - b. The Architect's review shall not be construed as an "approval," or to relieve the Contractor(s) and material suppliers of responsibility for errors or omissions in the submitted documents.
 - c. Modifications or comments made on the submittals or shop drawings during this review do not relieve the Contractor from compliance with the requirements of the drawings and specifications.
 - d. Acceptance of a specific item does not include acceptance of the assembly of which the item is a component.

D. The following list of items, definitions and required quantities is a minimum required for this project. Verify with FACILITY SERVICES SUBGROUP sections for additional quantities required within those divisions.

1. Product Data: Illustrations, standard schedules, performance charts, instructions, brochures, diagrams, other product information, color choices and/or manufacturer's catalog sheets shall be specially prepared for the Project (marked-up with project specifics) and shall be submitted in sequential sets for each category of work:
 - a. Quantity:
 - 1) Unless otherwise indicated in the Contract Documents, provide Six (6) sets.

- b. Material Safety Data Sheets (MSDS): MSDS are not required, but it is recognized that applicable federal and state laws require the submission of these data sheets to an Owner. MSDS shall be turned over to the Owner (without review by the Architect or it's consultants) in compliance with federal and state laws.
2. Shop Drawings: Newly prepared information, drawn to accurate scale, consisting of drawings, diagrams, schedules, and other data specifically prepared for the Project by the Contractor, a Subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Project. Do not reproduce Contract Documents or copy Standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.
 - a. Quantity: Provide One (1) reproducible original (vellum, sepia or mylar) and Three (3) opaque (blue-line or black-line xerographic) prints for each sheet or detail.
 - 1) The contractor shall receive the marked-up reproducibles and copy the required number of sets to the subcontractor, manufacturer's and/or material suppliers.
 - b. Contractor's use of Architect's Electronic CAD Files.
 - 1) Upon written request by Contractor, copies of the Architect's electronic CAD files may be available for Contractor's use in connection with this Project.
 - a) Contractor's written request shall be on the Architect's "Contractor's Document Usage Agreement for Requested Documents" and may include an additional Architect's Consultant's Agreements, outlining conditions for providing files.
 - b) Contractor's request shall be limited to drawings directly applicable to the Shop Drawings the Contractor wishes to create for submittal.
 - c) Contractor shall pay the Architect for work incurred for providing the requested files. Payment shall be submitted with the request.
 - 2) The Architect's electronic CAD files are limited to files that already exist and that not all files may be available at the Architect's and Architect's Consultant's discretion.
 - 3) The Architect's electronic CAD files are not part of the Contract Documents and have limitations to the accuracy, incorporating modifications, CAD system formats, CAD entity attributes and layering.
 - 4) The Architect's electronic CAD files have restrictions on Contractor's use, transmittal and delivery of files.
3. Samples: Physical examples specially prepared for the Project (marked-up with project specifics) which illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged.
 - a. Quantity:
 - 1) Unless otherwise indicated in the Contract Documents, provide Four (4) sets.
 - b. Color samples shall be submitted on 8-1/2" x 11" cards for all colors scheduling paint types specified utilizing the paint symbols designated by the Architect in the drawings and specifications.
 - c. Manufactured devices or equipment items:
 - 1) Quantity: One (1) sample, returned to supplier and which, when approved, may be incorporated into the Project.
4. Quality Assurance/Control submittals: Consists of design data, test reports, certificates, manufacturers instructions, and /or manufacturer's field reports.
 - a. Quantity:

- 1) Unless otherwise indicated in the Contract Documents, provide Six (6) sets.
 5. Closeout submittals: Maintenance data, operating manuals, project documents, engineering calculations, and/or warranties shall be submitted when required in the various specification sections:
 - a. Quantity:
 - 1) Unless otherwise indicated in the Contract Documents, provide Two (2) sets.
 6. Field Samples: Sample panels of in place construction, or selected area of completed substrates or work showing the anticipated compliance with specified characteristics in order to establish a standard of quality.
 - a. Quantity:
 - 1) See specific specification section requirements.
 7. Mockups: Full-sized erected assemblies, used for coordination purposes or for testing in a laboratory, or required for approval in a finish form before the actual Project construction begins.
 - a. Quantity:
 - 1) See specific specification section requirements.
- E. Substitution, Dispute or Claim Submittals:
1. Any substitution, dispute or claim submittals relating to this contract, or any Contract breach, which are not disposed of by agreement shall be promptly submitted in accordance with the GENERAL CONDITIONS, as a claim to and decided by the Architect who shall issue a written decision on the dispute.
 2. Adequate supporting data shall include, but is not limited; a statement of the reasons for the asserted entitlement, the certified payroll, invoice for material and equipment rental, and an itemized breakdown of any adjustment sought.
 3. If no "SUBMISSION UNDER PENALTY OF PERJURY" clause is provided within the GENERAL CONDITIONS, then the Contractor shall certify, at the time of submission of a substitution, dispute or claim, as follows:

(The rest of this page is left intentionally blank)

SUBMISSION UNDER PENALTY OF PERJURY

I _____, being the _____(Must be an officer), declare under penalty of perjury under the laws of the State of California, and do personally certify and attest that: I have thoroughly reviewed the attached substitution, dispute or claim for additional compensation and/or extension of time, and know its contents, and said claim is made in good faith; the supporting data is truthful and accurate; that the amount required accurately reflects the contract adjustment for which the Contractor believes the Owner is liable; and further, that I am familiar with California Government Code Section 12650, et seq, pertaining to false claims, and further know and understand that submission of certification of a false claim may lead to fines, imprisonment and/or other severe legal consequences.

By: _____ Contractor's Signature

_____ Contractor's Typed Name

Date: _____

Submission of a substitution, dispute or claim, properly certified, with all required supporting documentation, and written rejection or denial or all or part of the claim by Owner, is a condition precedent to any action, proceeding, litigation, suit or demand for arbitration by Contractor.

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PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULES

- A. Usage Agreement For Electronic Documents:
 - 1. Contractor's Usage Agreement for Electronic Files:
 - a. See attachment.

- B. The following schedule was prepared to assist the Contractor in knowing the required submittals for this project, but may not be complete. Specific submittal information as to what is required is contained within the individual specification sections and those individual sections shall govern in the event of a question.

- C. SUBMITTAL SCHEDULE
 - 1. 01 11 13 - SUMMARY OF WORK
 - a. QUALITY ASSURANCE/ CONTROL SUBMITTALS
 - 2. 01 25 00 - SUBSTITUTION PROCEDURES
 - a. SUBSTITUTION REQUEST FORMS
 - 3. 01 29 73 - SCHEDULE OF VALUES
 - a. SCHEDULE OF VALUES
 - 4. 01 32 16 - CONSTRUCTION SCHEDULES
 - a. CONSTRUCTION SCHEDULE, SHOP DRAWING SUBMITTAL SCHEDULE, CRITICAL PATH SCHEDULES, FRAGNETS.
 - 5. 01 32 26 - FORMS AND REPORTS
 - a. AS REQUIRED BY THIS SPECIFICATION SECTION AND OTHER SPECIFICATION SECTIONS.
 - 6. 01 33 00 - SUBMITTAL PROCEDURES
 - a. SHOP DRAWING AND SUBMITTAL SCHEDULE, COLOR SAMPLES OF ALL FINISH MATERIALS FOR COLOR BOARD SELECTION.
 - 7. 01 45 29 - TESTING LABORATORY SERVICES
 - a. TESTING SCHEDULE, TEST REPORTS
 - 8. 01 71 23 - FIELD ENGINEERING
 - a. COORDINATION DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
 - 9. 01 77 20 - PROJECT CLOSEOUT
 - a. ANOTATED CONTRACTOR'S AND ARCHITECT'S PUNCH LIST. ALL OPERATIONAL DATA, ALL MAINTENANCE MANUALS, ALL EXTRA MATERIALS.
 - 10. 01 78 36 - WARRANTIES
 - a. ALL GUARANTEES AND WARRANTIES
 - 11. 01 78 39 - PROJECT DOCUMENTS
 - a. PROJECT "AS-BUILT" DOCUMENTS, PROJECT "RECORD" DOCUMENTS AND PROJECT "CERTIFICATION" DOCUMENTS.

12. 03 11 01 - CONCRETE FORMWORK
 - a. PRODUCT DATA, SAMPLES, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
13. 03 15 14 - DRILLED ANCHORS
 - a. PRODUCT DATA, ICC EVALUATION SERVICE REPORTS, DSA APPROVAL LETTERS.
14. 03 20 00 - REINFORCEMENT
 - a. SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
15. 03 30 00 - CAST-IN-PLACE CONCRETE
 - a. PRODUCT DATA, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
16. 03 35 10 - POLISHED CONCRETE FINISHING
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/ CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
17. 03 37 13 - SHOTCRETE
 - a. PRODUCT DATA, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
18. 04 23 00 - GLASS MASONRY UNITS
 - a. SAMPLES, COLOR SAMPLES, PRODUCT DATA CERTIFICATION.
19. 05 30 00 - METAL DECK
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
20. 05 52 00 - RAILING SYSTEMS
 - a. MATERIALS LIST, SHOP DRAWINGS, AND WARRANTIES.
21. 06 18 00 - GLUE-LAMINATED CONSTRUCTION
 - a. SHOP DRAWINGS, VERIFIED REPORTS, AND WARRANTIES.
22. 06 61 16 - SOLID SURFACING
 - a. SHOP DRAWINGS, MANUFACTURER'S SPECIFICATIONS, COLOR SAMPLES, MOCK-UP, WI CERTIFICATION.
23. 07 21 00 - INSULATION
 - a. PRODUCT DATA, INSTALLATION INSTRUCTIONS, CLOSEOUT SUBMITTALS.
24. 07 31 13 - SHINGLES
 - a. PRODUCT DATA, SHOP DRAWINGS, SAMPLES, CLOSOUT SUBMITTALS.
25. 07 40 12 - MCM PANELS
 - a. PRODUCT DATA, SHOP DRAWINGS, SAMPLES, CLOSEOUT SUBMITTALS.
26. 07 72 00 - ROOF ACCESSORIES
 - a. PRODUCT DATA, SHOP DRAWINGS, SAMPLES AND WARRANTIES.
27. 07 81 16 - FIREPROOFING
 - a. MATERIALS LIST, COLORS, MANUFACTURER'S DATA, TEST DATA AND SAMPLES.
28. 07 95 00 - EXPANSION JOINTS
 - a. MATERIALS LIST, SHOP DRAWINGS, AND WARRANTIES.
29. 08 14 16 - WOOD DOORS
 - a. PRODUCT DATA AND SHOP DRAWINGS.
30. 08 33 00 - COILING DOORS
 - a. PRODUCT DATA, SHOP DRAWINGS AND WARRANTIES.
31. 08 34 73 - ACOUSTICAL DOORS AND FRAMES

- a. PRODUCT DATA, SHOP DRAWINGS AND WARRANTIES.
- 32. 08 44 00 - CURTAINWALL
 - a. PRODUCT DATA, SHOP DRAWINGS AND WARRANTIES.
- 33. 08 80 00 - GLASS
 - a. PRODUCT DATA, MATERIALS LIST, SAMPLES AND CERTIFICATES.
- 34. 08 91 00 - LOUVERS
 - a. PRODUCT DATA, SHOP DRAWINGS, CERTIFICATES AND COLORS.
- 35. 09 22 16 - METAL FRAMING
 - a. PRODUCT DATA (INCLUDING INSTALLATION METHODS) AND MATERIALS LIST.
- 36. 09 24 00 - CEMENT PLASTER
 - a. PRODUCT DATA (INCLUDING INSTALLATION METHODS) AND MATERIALS LIST.
- 37. 09 26 13 - VENEER PLASTER
 - a. PRODUCT DATA (INCLUDING INSTALLATION METHODS) AND MATERIALS LIST.
- 38. 09 30 13 - TILE
 - a. PRODUCT DATA, COLORS, SAMPLES, CERTIFICATES, MAINTENANCE MATERIAL AND WARRANTIES.
- 39. 09 51 00 - ACOUSTICAL CEILINGS
 - a. ACOUSTICAL TILE SAMPLES, SUSPENSION SYSTEM SAMPLES AND DSA APPROVED CEILING BRACING DRAWINGS.
- 40. 09 65 16 - RESILIENT SHEET
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
- 41. 09 91 00 - PAINTING
 - a. PRODUCT DATA, MATERIALS LIST, COLORS, MAINTENANCE INFORMATION AND WARRANTIES.
- 42. 10 05 00 - MISCELLANEOUS SPECIALTIES
 - a. PRODUCT DATA, COLORS AND SAMPLES (WHERE APPLICABLE) FOR ALL ITEMS.
- 43. 10 11 00 - VISUAL DISPLAY BOARDS
 - a. PRODUCT DATA AND SAMPLE COLORS.
- 44. 10 13 00 - DIRECTORIES
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
- 45. 10 14 53 - ROAD AND PARKING SIGNAGE
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
- 46. 10 21 00 - TOILET PARTITIONS
 - a. PRODUCT DATA, SHOP DRAWINGS, CERTIFICATES AND COLORS.
- 47. 10 26 00 - WALL AND CORNER GUARDS
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
- 48. 10 28 13 - TOILET ACCESSORIES
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
- 49. 10 44 00 - FIRE PROTECTION SPECIALTIES
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.

50. 10 51 13 - METAL LOCKERS
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
51. 10 56 13 - METAL STORAGE SHELVING
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
52. 11 52 13 - PROJECTION SCREENS
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
53. 11 66 53 - GYMNASIUM DIVIDERS
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
54. DIV. 22 - PLUMBING SECTIONS
 - a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
55. DIV. 23 -HEATING, VENTILATING AND AIR CONDITIONING SECTIONS
 - a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
56. DIV. 25- INTEGRATED AUTOMATION SECTIONS
 - a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
57. DIV. 26- ELECTRICAL SECTIONS
 - a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
58. DIV. 27 -COMMUNICATIONS SECTIONS
 - a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
59. DIV. 28- ELECTRONIC SAFETY AND SECURITY SECTIONS
 - a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
60. 31 20 00 - EARTHWORK
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, PROJECT RECORD DOCUMENTS, AND WARRANTIES, AND DRAWINGS SHOWING KNOWLEDGE OF THE EXTENT OF ENGINEERED PADS.
61. 31 31 00- SOIL TREATMENT
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, PROJECT RECORD DOCUMENTS, AND WARRANTIES.
62. 32 80 00- LANDSCAPE IRRIGATION
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, PROJECT RECORD DOCUMENTS, AND WARRANTIES.
63. 33 40 00- STORM DRAINAGE
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, PROJECT RECORD DOCUMENTS, AND WARRANTIES.

**CONTRACTOR'S
USAGE AGREEMENT FOR ELECTRONIC FILES -
ELECTRONIC FILE REQUEST FORM**

Project Name: _____

DA Project No.: _____

TO: DARDEN ARCHITECTS, INC.

6790 N. West Avenue

Fresno CA 93711

A. I _____ as a duly authorized agent of

_____, have a contract with the Owner to perform work on the above project in the following capacity:

- ___ Lease-Lease Back Agent
- ___ Construction Manager
- ___ General Contractor

B. We hereby submit for your consideration a request for Electronic Files on the behalf of

_____, and certify that they have a contract or subcontract to perform work on the above named project in the following capacity:

- ___ General Contractor
- ___ Sub-Contractor
- ___ Others under contract to a sub-contractor

C. I _____, certify the required attachments are included as follows:

- ___ Completed "Usage Agreement for Electronic Files Agreement• " along with appropriate related supplemental Agreements.
- ___ Files requested are specific and are not deemed vague or excessive and with individual sheet numbers identified, and the total number of sheets are correct.
- ___ The enclosed Payment is accurate (\$120 per sheet) and is made payable to Darden Architects, Inc..

Print Name,

Title

Signature

Date

**CONTRACTOR'S USAGE AGREEMENT
FOR ELECTRONIC FILES**

PROJECT NAME: _____

DA PROJECT NO.: _____

PROJECT ARCHITECT: _____

I _____, as a duly authorized agent of _____ - (Contractor) have a contract or subcontract to perform work on the above named project. The Contractor acknowledges having received at least one (1) complete set of Contract Documents for the project and has posted all Addenda and all other contract documents issued to date.

Contractor Document Usage Agreement

The Contractor is requesting the electronic CAD files of work prepared by the Architect and/or Architect's Consultants (Design Team) on the subject project, so that the information therein may be utilized in the Contractor's work on the same project. The Contractor understands that these files are being provided as a courtesy and they are strictly intended for the Contractor's sole convenience and they are not recognized Contract Documents. This request is subject to the following conditions, which the Contractor hereby agrees to abide by:

1. It is understood and agreed to that any files and/or documents provided are instruments of professional service by the Design Team and are intended for one-time use solely in the construction of this project. They are and shall remain the property of the Architect or the Architect's Consultants, who is deemed to be the author of the drawings and data, and who shall retain all common law, statutory law, and all other rights, including copyrights.
2. The Contractor shall indemnify and hold harmless, the Design Team, its officers, directors, employees or subcontractors, to the fullest extent permitted by law, against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees and defense costs arising out of or resulting from contractor's use of these electronic files, or in any way connected with the modification, misinterpretation, misuse, or reuse by the Contractor or by others.
3. The Contractor agrees that by using these electronic files, the Contractor is in no way relieved of the duty to fully comply with the Contract Documents, including and without limitation, the need to check, confirm and coordinate all dimensions and other details, take field measurements, verify field conditions and coordinate with all other contractors for the project.
4. It is agreed to that these electronic files are not Contract Documents. Differences may exist between electronic files and corresponding hard-copy Contract documents. The Design Team makes no representation regarding the accuracy or completeness of the electronic files provided to the contractor. In the event that a conflict arises, the signed and sealed hard-copy Contract Documents shall govern. Contractor is responsible for determining if any conflict exists.
5. The Contractor understands that the Design Team makes no representation as to the compatibility of these files with Contractor's computer hardware or software. The Contractor understands that the accuracy of the information is an artifact of the techniques used to generate it and is in no way intended to imply actual accuracy. It is also understood that the automated conversion of information and data from the system and format used by the Design Team to an alternate system or format cannot be

accomplished without the possibility of introduction of inexactitudes, anomalies and errors.

- 6. Because information presented on the electronic files can be modified, unintentionally or otherwise, the Design Team reserves the right to edit the drawings to remove information deemed not necessary and/or remove all indications of ownership and/or involvement from each electronic display.
- 7. The Design Team will only furnish those drawings directly applicable to the shop drawings the contractor wishes to create. The Contractor understands that not all electronic files may be available at the Design Team's discretion.
- 8. The Contractor understands that the Architect's Consultants may have Additional Conditions for release of their electronic files or documents, and the Contractor hereby agree to abide by the Consultants conditions in addition to the stated conditions in this agreement. Additional Conditions (if any) are attached to this agreement.
- 9. The Contractor understands that the Architect and the Architect's Consultants will incur certain costs in providing the requested electronic files. The Contractor agrees to pay the Design Team a service fee of \$120.00 per sheet, per delivery, prior to any delivery of the electronic files to compensate the Design Team for the labor to prepare and transmit the files and for the additional risk that this transfer will occasion.
- 10. Under no circumstances shall delivery of the electronic files for use by the Contractor be deemed a sale by the Owner, the Design Team, or any member of the Design Team. The Design Team makes no warranties, either expressed or implied, of merchantability or fitness for any particular purpose. In no event shall the Design Team be liable for any loss of profit or any consequential damages as a result of Contractor's use or reuse of the electronic files.

Darden Architects, Inc.

Attachments:

Civil Structural Mechanical Electrical Others

Description of the requested documents and/or CAD files:

Printed Name Title

Signed Dated

FOR USE BY ARCHITECT ONLY

- Check Not Attached – Not Accepted
- Accepted
- Accepted as Noted
- Not Accepted

By _____

Date _____

Remarks _____

END OF SECTION

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SECTION 014100 – REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - 2. Section 4-317 (c), Part 1, Title 24, CCR, requires the following:
 - a. "The intent of these drawings and specifications is that the work of the alteration, rehabilitation or reconstruction is to be in accordance with Title 24, California Code of Regulations. Should any existing conditions such as deterioration of non-complying construction be discovered which is not covered by DSA approved documents wherein the finished work will not comply with Title 24, California Code of Regulations, a construction change document, or a separate set of plans and specifications, detailing and specifying the required repair work shall be submitted to and approved by DSA before proceeding with the repair work."
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. References to standards, codes, specifications, recommendations and regulations, refer to the latest edition or printing in effect at the date of issue shown in the Documents unless another date is implied by the suffix number of the Standards.
- B. Applicable portions of the Standards listed that are not in conflict with the Contract Documents shall be construed as specification for this work.
- C. General Standards:
 - 1. AFPA American Forest and Paper Association
 - 2. ANSI American National Standards Institute
 - 3. ASTM American Society for Testing and Materials
 - 4. CAL/OSHA California Occupational Safety and Health Administration
 - a. State of California Construction Safety Orders
 - 5. CS Commercial Standards of the US Department of Commerce
 - 6. EPA Environmental Protection Agency
 - 7. FMG Factory Mutual Group

- 8. NIBS National Institute of Building Sciences
- 9. NIST National Institute of Standards and Technology
- 10. NFPA National Fire Protection Association
- 11. OSHA Occupational Safety and Health Administration
 - a. Federal Construction Safety Orders
- 12. PS Product Standards of the US Department of Commerce
- 13. SS-CDOT "Standard Specification":
 - a. State of California Department of Transportation (CalTrans)
- 14. UL Underwriters Laboratory Incorporated
- 15. WH Warnock Hersey

1.3 SUBMITTALS

- 1. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
- 2. Quality Assurance/Control Submittals:
 - a. Certificates:
 - 1) Submit three (3) copies of certificates written on the Contractor's Letterhead indicating that the required codes shall be present at the Job Site.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

- 1. All codes, laws, ordinances, rules, regulations, orders and other legal requirements of City, County, State, Federal and other public authorities which bear on performances of Work shall be applicable to Project. Latest editions shall be applicable unless specified otherwise.
- 2. Relationship between Applicable Codes and Contract Documents. The Contract Documents have been developed with the intent to conform to the applicable codes. Nothing within the Contract Documents shall be construed to permit Work not conforming to the applicable codes.

B. Major Governing Codes And Regulations:

- 1. General: All work shall comply with the requirements of the following codes and regulations. Special reference in other Sections of the Specifications to a specific code will be by use of the abbreviation given in front of the Code.
 - a. Freestanding equipment (if applicable) shall be provided and installed in accordance with the seismic requirements where the Project is located.
- 2. NOTE: * -Indicates that a copy of these codes shall be at the job site at all times.
- 3. AUTHORITY HAVING JURISDICTION:
 - a. AHJ: Authority Having Jurisdiction
- 4. FEDERAL LAW:
 - a. ADA: Americans with Disabilities Act
- 5. CALIFORNIA CODE OF REGULATIONS (Previously known as the California Administrative Codes)
 - a. CCR-T5: California Code of Regulations, Title 5-Education.
 - b. CCR-T8: California Code of Regulations, Title 8-Industrial Safety
 - 1) Contains the California Elevator Safety Code.
 - c. CCR-T19: California Code of Regulations, Title 19-Public Safety.
 - d. CCR-T21: California Code of Regulations, Title 21-Public Works.

- e. *CCR-T24: California Code of Regulations, Title 24, Part 1-Administrative Regulations.
 - 6. CALIFORNIA BUILDING, ELECTRICAL, MECHANICAL, PLUMBING, ENERGY, FIRE, and REFERENCED CODES
 - a. *CBC: California Building Code 2019 California Code of Regulations, Title 24-Part 2, Volumes 1 and 2, CCR-T24, based on the 2018 edition of the IBC (International Building Code), with the latest California State Amendments.
 - b. *CEC: California Electrical Code 2019, California Code of Regulations, Title 24-Part 3, CCR-T24, based on the 2017 edition of the NEC (National Electrical Code), with the latest California State Amendments.
 - c. *CMC: California Mechanical Code 2019, California Code of Regulations, Title 24, Part 4, CCR-T24, based on the 2018 edition of the UMC (Uniform Mechanical Code), with the latest California State Amendments.
 - d. *CPC: California Plumbing Code 2019, California Code of Regulations, Title 24, Part 5, CCR-T24, based on the 2018 edition of the UPC (Uniform Plumbing Code) by IAPMO, with the latest California State Amendments.
 - e. *CEnC: California Energy Code 2019, California Code of Regulations, Title 24, Part 6, CCR-T24, and the latest California State Amendments.
 - f. *CFC: California Fire Code 2019, California Code of Regulations, Title 24, Part 9, CCR-T24, based on the 2018 edition of the IFC (International Fire Code), with the latest California State Amendments.
 - 1) In addition to all other Chapters in the CFC to be followed, attention is specifically called out to comply with Chapter 33 - "Fire Safety During Construction and Demolition".
 - g. CBSC: California Building Standards Commission, California Code of Regulations, Title 24, Part 10, CCR-T24.
 - h. CGBSC: California Green Building Standards Code 2019, California Code of Regulations, Title 24-Part 11, CCR-T24 (CALGreen).
 - i. CRSC: California Referenced Standard Code 2019, Title 24, Part 12, CCR-T24, with the latest California State Amendments.
 - 7. DSA: DIVISION OF THE STATE ARCHITECT:
 - a. DSA: Regulations of the Division of the State Architect of the State of California:
 - 1) ACS: Access Compliance Section
 - 2) SSS: Structural Safety Section
 - 3) FLS: Fire and Life Safety Section
 - 4) IR: Interpretation of Regulations.
 - b.
 - 8. OTHER STATE AGENCIES:
 - a. AQMCD: Air Quality Management Control District in the area where the project is located.
 - b. RWQCB: Regional Water Quality Control Board in the area where the project is located.
- C. Governing Authority:
- 1. DSA: Division of the State Architect.
 - a. The provisions of the State of California, Statutes of 1933, Chapter 59, Safety of Construction of Public School Buildings Act, and the latest regulation based thereon, of the Division of the State Architect of the State of California, shall be the governing authority and shall take precedence over other applicable codes.

- b. The following shall be stamped and signed by the A/E on Record or Delegated Design Professional per CBC, Part 1, Section 4-317 (h), and the following:
 - 1) Addenda or Bulletins per Sec. 4-338(b): All addenda or bulletins shall be signed and approved by the Division of State Architect.
 - 2) Construction Changes per Sec. 4-338(c): All Construction Changes related to structural items, fire safety issues, life safety issues and accessibility compliance issues shall be reviewed and approved by the appropriate Division of the State Architect.
 - 3) Substitutions (per DSA) shall be treated like Addenda, or Construction Changes per Sec. 4-338(c), and IR A-6: All substitution requests and substitutions related to structural items, fire safety issues, life safety issues and accessibility compliance issues shall be reviewed and approved by the appropriate Division of the State Architect prior to fabrication and installation.
- 2. AHJ: Authority Having Jurisdiction.
 - a. This Project will be under the authority of:
 - 1) The City of Tulare Codes and Standards.
 - 2) The County of Tulare - Environmental Health Services Division Codes and Standards

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 014200 – REFERENCES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - a. The abbreviations, symbols and work meanings not defined in the Contract Documents are in accordance with building industry usage and convention. Questions which arise as to "meaning," or intent shall be referred to the Architect prior to bidding for interpretation.
 - b. Refer to drawings for additional abbreviations and symbols.
 - c. Refer to GENERAL and SPECIAL or SUPPLEMENTAL CONDITIONS and specific specification Sections for additional definitions.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

- A. EXECUTE Perform what is required to install, apply, erect and otherwise incorporate products in to this Project.
- B. FURNISH Supply products required, deliver to Project, unload, store and install as required in location as directed by Contractor, Owner or Architect.
- C. GUARANTEE An assurance by the seller or installer that products or Work are as represented or will be as promised in compliance with Specifications. Synonymous and interchangeable with WARRANTY.
- D. INSTALL Incorporate into this Project.
- E. PRODUCTS The material, equipment, fixtures and other physical substances required to execute the Project.
- F. PROVIDE Furnish and Install into this Project.

- G. WARRANTY An assurance by the seller or installer that products or Work are as represented or will be as promised in compliance with Specifications. Synonymous and interchangeable with GUARANTEE.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 014523 – TESTING AND INSPECTION SERVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. One Project Inspector (Owner's Inspector), including Special and/or Assistant Inspector(s) (minimum Class 1 Rating), as required, will be employed by the Owner in accordance with the requirements of CCR-Title 24, Part 1, CALIFORNIA ADMINISTRATIVE CODE, and the latest amendments, and will be assigned to the Project.
 - a. Duties of a Project Inspector are specifically defined in CCR-Title 24, Part 1, and the latest amendments.
 - b. Special Inspections (not within the Project Inspector's abilities) shall be performed by the Testing Laboratory or other Special Inspector as approved by the Owner and DSA.
 - 1) All Special Inspections shall be approved by DSA in accordance with CCR-T24, Part 1, Chapter 4, Group 1, Article 5, Section 4-335.1.
2. The Project Inspector shall be employed by the Owner and approved by the Architect, Structural Engineer, and DSA.
 - a. See the Title Page of this Project Manual for the name of this Project.
 - b. Payment of the Project Inspector will be by the Owner.
3. Provide all access, facilities and information required by the Project Inspector for the Project.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:

1. ALL DIVISION 00 SPECIFICATION SECTIONS.
2. ALL DIVISION 01 SPECIFICATION SECTIONS.
3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Responsibilities of the Project Inspector:

1. The Project Inspector will be required to provide inspection of the Work (including "Continuous Inspection") as required in CCR-T24, Part 1:
 - a. Educational Work: Chapter 4, Group 1, Article 6, 4-342 (b).
2. The Project Inspector will report to the Owner, the Architect and DSA as required during the progress of the Work.
3. The Project Inspector shall review all Pay Requests prior to submittal to the Architect.

B. Responsibilities of the Contractor:

1. Written Statement of Responsibility to the Owner and the Authority Having Jurisdiction (DSA) per CBC Chapter 17A:
 - a. Provide a written Statement of Responsibility regarding the Contractor's understanding of the special inspection requirements and identifying individuals in their firm responsible for exercising control over the conformance to the construction documents.
2. Provide the Project Inspector free access to any and all parts of the Project at all times.
3. Provide the Project Inspector information necessary to keep him fully informed with respect to the progress, manner and character of Work.
4. Perform no Work in absence of the Project Inspector unless alternate arrangements have been made in advance and agreed to by the Owner, the Architect and DSA.
5. The Owner's "Inspection of Work" by the Project Inspector shall not relieve the Contractor from any conditions of this Contract.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 1. Quality Assurance/Control Submittals:
 - a. Written Statement of Responsibility to the Owner and the Authority Having Jurisdiction per CBC Chapter 17A.
 - b. Project Inspector's Field Reports:
 - 1) Submit four (4) copies of reports.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
 1. In accordance with Specification Section - REGULATORY REQUIREMENTS.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 014529 – TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. The Owner's Testing Laboratory shall be employed by the Owner and approved by the Architect, Structural Engineer, and DSA.
 - a. Payment of the Owner's Testing Laboratory will be by the Owner.
 - b. The Owner shall pay for all initial testing indicated as paid for by Owner except as specified otherwise or in the schedule at the end of this section.
 - 1) Cost of re-testing (due to initial failures) shall be back-charged to the Contractor, and those excess costs will be deducted from the Contract Price.
 - 2) Cost of testing (due to shop fabrication or in-plant testing out of state and beyond a 75 mile radius of the Project Site) shall be back-charged to the Contractor, and those excess costs will be deducted from the Contract Price.
2. Provide all access, facilities and information required for the testing of the various portions of the Work as required by Regulatory Agencies, Planning, Agencies, Building Agencies, and other Governmental Inspectors, the Contract Documents and the Owner.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:

1. ALL DIVISION 00 SPECIFICATION SECTIONS.
2. ALL DIVISION 01 SPECIFICATION SECTIONS.
3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Responsibility of the Testing Laboratory:

1. Taking all specimens.
2. Performing Tests.
 - a. The Testing Laboratory's duties shall include all tests required by the DSA 103 Form prepared at the time of DSA Approvals, and any other testing as determined by authorities or the Project Inspector during the course of the work.
 - b. Special Inspections (not within the Project Inspector's abilities) shall be performed by the Testing Laboratory or other Special Inspector as approved by the Owner and DSA.
 - 1) All Special Inspections shall be approved by DSA in accordance with CCR-T24, Part 1, Chapter 4, Group 1, Article 5, Section 4-335.
3. Writing Test Reports
4. Review of "Continuous Inspection" reports by the Project Inspector.

- a. Portions of the Work requiring "Continuous Inspection" shall be performed by the Project Inspector (if qualified) and all reports will be reviewed by the Testing Laboratory.
- 5. Distribute Test Reports to the Owner, Architect, applicable Engineer, Contractor and to DSA.

B. Responsibilities of the Contractor:

- 1. Contractor shall provide a Testing Schedule that is in accordance with the following:
 - a. Format of the Testing Schedule shall be in accordance with Specification Section – CONSTRUCTION SCHEDULES.
 - b. Cooperates with the Testing Laboratory's schedule of required testing.
 - c. Contractor shall coordinate Construction Schedule and Testing Schedule.
 - 1) Format of testing schedule in accordance with Specification Section – CONSTRUCTION SCHEDULES.
- 2. Cooperation with testing laboratory:
 - a. Provide access to Work being tested.
 - b. Provide test samples as selected by testing laboratory.
 - c. Schedule Work so that there shall be no excessive inspection time.
 - 1) At times that an inspector is required, sufficient work shall be laid out and adequate personnel supplied so that the inspector's time shall be used to full advantage.
 - 2) If inspection costs become excessive because of poor shop or construction procedure, such excess costs will be paid for by the Owner, but deducted from the Contract Price.
 - d. Inspections and tests required by regulatory agencies shall be the responsibility of and shall be paid for by the Owner unless specified otherwise.
 - e. Inspections and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.
 - f. Test Reports:
 - 1) Distribute test reports and related instruction to insure all required re-testing and/or replacement of materials.
 - g. Payment of Testing:
 - 1) All testing shall be paid for by the Owner.
- 3. Contractor shall be backcharged for re-testing, excessive distance from the Project Site, or extra testing required because of initial failures.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

- 1. Quality Assurance/Control Submittals:
 - a. Test Reports:
 - 1) Submit four (4) copies of testing laboratory's report.

1.4 QUALITY ASSURANCE

A. Qualifications:

- 1. Testing Laboratory Qualifications:
 - a. In accordance with the latest Edition of ASTM E-329.

- B. Regulatory Requirements and Reference Standards:
 - 1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. In accordance with regulatory agencies and appropriate ASTM Standards.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULES

- A. Testing Schedule at the end of this section should be used as a guide only and it is not considered a complete list. Refer to regulatory agency requirements and specific specification section for complete testing requirements.

B. TESTING SCHEDULE

- 1. 03 15 14 - DRILLED ANCHORS
 - a. Tension Tests.
 - 1) Paid by Owner.
- 2. 03 20 00 - REINFORCEMENT
 - a. Rebar Material per ACI 318, CBC TABLE 1705A.2.1, CBC Sections 1903A.1, 1905A, and 1910A.
 - 1) Paid by Owner
 - b. Continuous Inspection of Welds per ACI 318, CBC TABLE 1705A.2.1, CBC Sections 1903A.8, 1905A, and 1910A.
 - 1) Paid by Owner
- 3. 03 30 00 - CAST-IN-PLACE CONCRETE
 - a. Cement Material per ACI 318, and CBC Sections 1903A, 1905A, and 1910A.
 - 1) Paid by Owner
 - b. Aggregate Material per ACI 318.
 - 1) Paid by Owner
 - c. Concrete Mix per ACI 318. CBC Sections 1903A and 1910A.
 - 1) Paid by Owner
 - d. Concrete Strength Tests per ACI 318.
 - 1) Paid by Owner
 - e. Concrete Compression Tests per ACI 318.
 - 1) Paid by Owner
- 4. 04 22 00 - CONCRETE MASONRY UNITS
 - a. Grout Tests/Mortar Tests per CBC Section 2105A.3.
 - 1) Paid by Owner
 - b. Continuous Inspection of Laying Block and Block Cores per THE MASONRY SOCIETY - TMS 402 and TMS 602, as set forth in Tables 3 and 4, Level 3 requirements and Chapter 21A. Testing shall be in accordance of CBC Section 2105A.
 - 1) Paid by Owner

**TESTING LABORATORY
SERVICES**

2180

- c. Concrete Masonry Unit Tests per CBC Section 2105A.6.
 - 1) Paid by Owner
- 5. 05 12 00 - STEEL AND FABRICATIONS
 - a. Steel Material per CBC Section 1705A.2.
 - 1) Paid by Owner
 - b. High Strength Bolts and installation per CBC Section 1705A, and CBC Section 1705A.2.6.
 - 1) Paid by Owner
 - c. Inspection of Shop and Field Welding per CBC Section 1705A, and CBC Section 1705A.2.5.
 - 1) Paid by Owner
- 6. 05 30 00 - METAL DECK
 - a. Steel Material per CBC Section 1705A, and CBC Section 1705A.2.2.
 - 1) Paid by Owner
 - b. Inspection of Shop and Field Welds per CBC Section 1705A, and Table 1705A.2.1.
 - 1) Paid by Owner
- 7. 09 22 16 - METAL FRAMING
 - a. Metal Stud Material.
 - 1) Paid by Owner
 - b. Metal Stud Welding.
 - 1) Paid by Owner
- 8. DIV. 22 - PLUMBING
 - a. Non-Leaking System
 - 1) Paid by Contractor
 - b. Bacteriological Purity
 - 1) Paid by Contractor
- 9. DIV. 23 - HEATING, VENTILATING AND AIR CONDITIONING
 - a. Equipment Operation
 - 1) Paid by Contractor
 - b. System Energy Balance
 - 1) Paid by Contractor
 - c. Non-Leaking Hydronic System.
 - 1) Paid by Contractor
- 10. DIV. 26 - SERVICE AND DISTRIBUTION
 - a. Equipment Operation
 - 1) Paid by Contractor
 - b. Protective Systems
 - 1) Paid by Contractor
- 11. DIV. 26 - LIGHTING
 - a. Equipment Operation
 - 1) Paid by Contractor
- 12. DIV. 27 - MASTER CLOCK AND PUBLIC ADDRESS SYSTEM
 - a. Equipment Operation
 - 1) Paid by Contractor
- 13. DIV. 28 - FIRE SPRINKLER SYSTEM
 - a. All tests required by NFPA #13.
 - 1) Paid by Contractor
- 14. DIV. 28 - WET CHEMICAL FIRE SUPPRESSION SYSTEM
 - a. All tests required by NFPA #17A.
 - 1) Paid by Contractor

15. 31 20 00 - EARTHWORK
 - a. Compaction Test
 - 1) Paid by Owner
 - b. Inspection of Excavations and Fills per CBC Table 1705A.6.
 - 1) Paid by Owner
 - c. Department of Toxic Substances Control (DTSC) Independent Testing of Imported soil
 - 1) Paid by Contractor

- C. Division of the State Architect "Statement of Structural Tests and Special "Inspections":
 1. In addition to the TESTING SCHEDULE cited above, and elsewhere within the documents, DSA requires the Contractor to schedule and manage the following tests to be performed and reported as required for this Project.
 2. Failure to schedule these tests is grounds for reduction in Monthly Payment Request authorization, and may delay distribution of the Final Payment.
 3. Refer to the approved DSA 103-Listing of Structural Tests and Special Inspections Form.

END OF SECTION

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SECTION 015000 – TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install all Temporary Utilities, Support Facilities, and Protection Facilities materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Shop Drawings:
 - a. Project Sign.
 2. Quality Assurance/Control Submittal:
 - a. Copy of Application to APCD for Dust Prevention and Control Plan.
 - b. Copy of approved Application to APCD for Dust Prevention and Control Plan.
 - c. Copy of Application to local City or County Engineer for Traffic Control.
 - d. Copy of approved Application to local City or County Engineer for Traffic Control.
 - e. Temporary Project Enclosure Plan.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. CAL/OSHA California Division of Occupational Safety and Health Administration
 - c. CF County of Fresno, Codes and Ordinances
 - d. EPA Environmental Protection Agency

B. Dust Prevention and Control Plan:

1. Prior to commencing the Work, prepare a Dust Prevention and Control Plan and obtain review and approval of the Air Pollution Control District (APCD) in the area where the project is located.
 - a. Prepare application and file with appropriate fees to APCD upon completion of Dust Prevention and Control Plan.
2. The Dust Prevention and Control Plan shall specify the methods of control that will be utilized, demonstrate the availability of needed equipment and personnel, and identify a responsible individual who, if needed, can authorize implementation of additional measures.
3. All construction shall comply with applicable elements of the APCD's regulations.
4. The Dust Prevention and Control Plan shall include, but not be limited to, the following:
 - a. Contractor's name and project identification information.
 - b. Procedures and measures to be implemented, but not be limited to:
 - 1) All material excavated or graded shall be sufficiently watered to prevent excessive amounts of dust.
 - 2) During periods of high winds, all clearing, grading, earth moving, or excavation shall cease when dust control measures are unable to avoid visible plumes.
 - 3) All dust producing material transported off site shall be either sufficiently watered or securely covered to prevent excessive amounts of dust.
 - 4) The area disturbed by clearing, earth moving, or excavation activities shall be minimized at all times.
 - 5) All watering of areas shall be only to the extent required to keep the soil particles in a moist condition and not to the extent that erosion of surface soil occurs.
 - 6) To control general fugitive dust, on-site vehicle speed shall be limited to 15 mph.
 - 7) All areas with vehicle traffic shall be watered periodically for stabilization of dust emissions.
 - 8) Periodically streets adjacent to the project site shall be cleaned as required to remove silts which may have accumulated from construction activities.

C. Traffic Control Plan:

1. Prior to commencing the Work, prepare a Traffic Control Plan and obtain approval of the local City or County Engineer in the area where the project is located.
 - a. Prepare application and file with appropriate fees to the local City or County Engineer upon completion of Traffic Control Plan.
2. The Traffic Control Plan shall include information on construction timing and phasing and proposed methods of alleviating potential hazardous and/or inconvenient conditions. Such methods can include, but are not limited to, the use of flagmen, barricades, signs, warning lights, detours, phased lane closures, coordination with adjacent property owners, and coordination with law enforcement, fire protection and other emergency service agencies.

D. Temporary Project Enclosure Plan:

1. Prior to commencing the Work, prepare a Temporary Project Enclosure Plan indicating the protection of people, animals, and partial and fully completed work until occupancy by the Owner.

2. Identify temporary egress from existing occupied facilities and as required by authorities having jurisdiction.
3. The Temporary Project Enclosure Plan shall include, but not be limited to, the following:
 - a. Contractor's name and project identification information.
 - b. Indicate the duration of the proposed measures based on the completion of the work as a whole and if any phases of work are identified.
 - c. Indicate proposed temporary fencing and potential exit and entry paths.
 - 1) Show gate and door locations and indicate who has access.
 - d. Indicate proposed temporary wall location(s) and potential exit and entry paths.
 - 1) Show door location(s) and indicate who has access.
 - e. Indicate type of material used for temporary fencing, walls, gates, and doors.
 - f. Indicate proposed temporary roads and paved areas.
 - g. Indicate proposed temporary offices and storage areas.

E. Copy of approved Fire Protection Program:

1. Contractor shall be responsible for the development, implementation, and maintenance of a written plan establishing a fire prevention program at the project site applicable throughout all phases of the construction, repair, alteration, or demolition work in accordance with CFC Chapter 33, Section 3308 and sub-sections.
2. It is the Contractor's responsibility to contact local Fire Authority to discuss the plan.
 - a. A copy of the report should be made available to the Project Inspector and local Fire Authority.
3. Approval Required: Prior to commencing the Work, prepare a Fire Protection Program and obtain review and approval from the local Fire Authority in the area where the project is located.
4. Plan shall address at a minimum:
 - a. Each phase of the construction, repair, alteration, or demolition work.
 - b. Designate responsible program superintendent in accordance with CFC 3308.2.
 - c. Duties of staff.
 - d. Staff training requirements.
 - e. Prefire plans.
 - f. Fire protection devices.
 - g. Hot work operations.
 - h. Impairment of fire protection systems.
 - i. Temporary covering of fire protection devices.

1.4 PROJECT CONDITIONS

A. Environmental Requirements:

1. Heating and Cooling:
 - a. Provide temporary heating and cooling required by construction activities for curing, acclimating the building or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed, and is maintained prior, during and after the installation in accordance with the exterior or interior building materials temperature and humidity guidelines.
 - 1) Do not use heating units that contribute moisture to the enclosed spaces under construction.
2. Ventilation and Humidity Control:

- a. Provide temporary ventilation required by construction activities for curing, acclimating the building or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
 - 1) Exterior Moisture Control:
 - a) Perform the installation of all exterior building cladding only after the substrate to which they are being applied is dry and ready to receive them. Do not apply any cladding if it will trap moisture inside a wall or roof cavity (i.e. insulation that has become wet for whatever reasons).
 - 2) Interior Moisture Control:
 - a) Perform the installation of all interior moisture sensitive building materials only after the building or space is acclimated to the final environmental conditions under which the building is to be operated in accordance within the Owner's humidity control guidelines.
 - b. Maintain a consistent humidity in accordance with the guidelines for those materials in the space at least seven (7) days prior to installation of any moisture sensitive materials (i.e. Veneer Plaster, Gypsum Board, Ceiling Tiles, Wood Sensitive Floors, other Flooring sensitive to moisture levels, Interior Painting, etc.).
 - c. Maintain the same levels or temperature and humidity during the installation of those materials, and after the installation of those materials until the building's own mechanical systems can be turned on to maintain the facility within the Owner's temperature and humidity control guidelines.
 - d. Replace any materials that have become wet and damaged due to the Contractor not properly protecting installed building materials at no additional cost to the Owner.
3. Dust control:
 - a. Perform work in a manner as to minimize the spread of dust and flying particles.
 - b. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.
 4. Burning: No burning will be allowed on-site.
 5. Noise Control:
 - a. Stationary noise sources shall be of a low-noise emission design, consistent with the best available noise reduction technology.
 - b. The hours of operation of noise-generating equipment shall be restricted to 6:00 a.m. to 7:00 p.m. Monday through Friday, and to 8:00 a.m. to 6:00 p.m. on Saturday and Sunday.
 - c. Mufflers shall be required on all gas and diesel-powered equipment.
- B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
 2. Cultural Resources:
 - a. The Contractor is advised of the possibility that cultural resources may be discovered during project activities.

- b. If any cultural or paleontological materials are uncovered during project activities, work in the area or any area reasonably suspected to overlie adjacent remains shall be stopped and the Architect advised of the discovery. The Architect will notify the appropriate agency and the work shall remain stopped until professional cultural resources evaluation and/or data recovery excavation can be planned and implemented. Appropriate measures to protect remains from accidents, looting, and vandalism shall be implemented immediately on discovery.
- c. If human remains are discovered, the work in the area or any area reasonably suspected to overlie adjacent remains shall be stopped and the County Coroner and the Architect shall be notified immediately. Appropriate measures to protect remains from accidents, looting, and vandalism shall be implemented immediately on discovery. The work shall remain stopped until professional cultural resources evaluation and/or recovery excavation can be planned and implemented.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- A. Fire Protection During Construction:
 - 1. Provide Temporary Fire Protection per CFC Chapter 33 during demolition and construction.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
 - 1. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 - 2. Execution of work under this specification section shall constitute acceptance of existing conditions.
 - 3. Obtain all necessary permits and authorizations by regulatory agencies required to perform the work under this section.

3.2 PREPARATION

- A. Coordination:
 - 1. Before proceeding, verify plans match existing conditions.
 - 2. Coordinate work under this specification with work specified under other sections to ensure proper and adequate interface of work.
- B. Protection:
 - 1. The Contractor shall verify and protect existing landscaping, asphalt area, concrete walkways, and other site improvements to remain on the site before proceeding with the Work.
 - 2. Prior to starting Work, hose bibbs, utility lines, etc., to be abandoned and removed within the construction area shall be stubbed off outside the limits of construction.

3. Verify and protect utilities to remain within the construction area and provide special construction for their protection.

3.3 IMPLEMENTATION

A. General:

1. Perform Work and provide and maintain Temporary Utilities and Temporary Facilities in accordance with the requirements of all regulatory authorities having jurisdiction.
2. Contractors shall cooperate with other contractors and the Owner in the use of the site, Temporary Utilities, Temporary Facilities and shall adjust their operations to maintain harmonious relations and uninterrupted progress of the Work.
3. The Contractor shall assume all responsibility for the provision and maintenance of these Temporary Utilities and Temporary Facilities and for the provisions of public safety where the operations under this Contract interface with public areas.
4. Relocate and modify Temporary Utilities and Temporary Facilities, as required by progress of the Work.
5. Remove Temporary Utilities and Temporary Facilities upon completion of the Project.
6. Temporary Utilities and Temporary Facilities are to be provided and maintained from commencement of Work until final acceptance.
 - a. The Contractor shall pay all charges required of him for the duration of the project, following the date of the Notice of Substantial Completion.

B. Temporary Utilities:

1. Install temporary service or connect to existing service.
 - a. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
 - 1) Minimum forty-eight (48) hours prior notice to any interruption.
2. Sewers:
 - a. Provide temporary service to remove effluent lawfully.
3. Storm Drainage:
 - a. Provide temporary service as necessary to remove storm water. Work shall be performed in accordance with the requirements of the Storm Water Pollution Prevention Plan (SWPPP), if any. If no SWPPP is required, then follow local authorities having jurisdiction requirements.
4. Water:
 - a. The Owner will pay for all water supply for all purposes of construction at a location to be designated at the site. Extensions within the site shall be provided by the Contractor and maintained in a safe and efficient manner.
5. Electrical:
 - a. The Owner will pay and the Contractor shall provide for all electrical facilities and services for all purposes of power and lighting for construction at a location to be designated at the site. Extensions within the site shall be provided by the Contractor and maintained in a safe and efficient manner.
 - 1) The Contractor shall pay for cost of electrical energy required in connection with the testing of such equipment as generators, transformers, power machinery, and similar equipment installed in the work.
 - b. The Contractor will provide electrical energy to all subcontractors as required on or about the premises.

- c. The Contractor will provide power outlets having adequate electrical characteristics and lighting of adequate intensity for the use of other contractors within reasonable distances from their needs and within a reasonable period of time after the other contractors have requested them.
 - 6. Telephone:
 - a. The Contractor shall provide and pay for all telephone service and telephone equipment in the Field Offices until completion of the Work.
 - 1) Provide an additional dedicated phone line for modem/network connection in the Project Inspector's Field Office for use by the Architect's representative.
 - 7. Heating:
 - a. Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity.
 - b. Select UL or FM approved equipment that will not have a harmful effect on completed installations or elements being installed.
 - 1) Except where use of the permanent heating system is authorized, provide temporary units that do not introduce moisture into the newly constructed building spaces.
 - 2) Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.
 - c. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
- C. Temporary Facilities:
- 1. Support Facilities:
 - a. Offices and Storage:
 - 1) Provide temporary offices and storage facilities located within the construction area.
 - 2) Protect materials, construction work and their operations from weather, vandalism, and theft.
 - b. Sanitary Facilities:
 - 1) Provide adequate, self-contained toilets as required for all persons employed on the Project.
 - 2) In no case shall the permanent plumbing fixtures of the Project be used for this purpose.
 - c. Temporary Roads and Paved Areas:
 - 1) Construct and maintain temporary roads and paved areas adequate for construction operations and fire protection during construction.
 - d. Traffic Controls:
 - 1) Implement procedures and measures outlined in the local jurisdiction's approved Traffic Control Plan.
 - 2) Maintain access for fire-fighting equipment and access to fire hydrants.
 - 3) Conduct work and comply with applicable building codes and regulations regarding the use of public streets and sidewalks and the proper barricading and lighting of public thoroughfares surrounding the construction activities.
 - 4) Provide and maintain access as required to perform work.
 - 5) Repair all damage as a result of work performed on the project to adjacent roads, streets, drives and walks. Restore to condition as good as existed at commencement of the Work.
 - e. Project Sign:

- 1) Install project sign as submitted and approved.
- 2) No other signs will be allowed on the project.
- f. Existing Elevator Use:
 - 1) Use of Owner's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to the Owner.
 - 2) Do not load elevators beyond their rated weight capacity.
- g. Existing Stair Use:
 - 1) Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to the Owner.
2. Protection Facilities:
 - a. Existing Facilities:
 - 1) Protect existing vegetation, equipment, structures, utilities, and other improvements at project site and on adjacent properties, except those indicated to be removed or altered. Damage occurring during the course of construction shall be repaired to condition at the start of the Work.
 - b. Environmental:
 - 1) Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - c. Project Enclosure:
 - 1) Implement procedures and measures outlined in Temporary Project Enclosure Plan.
 - 2) Project enclosure shall protect materials, construction work, and operations from vandalism, theft, and to exclude the intrusion of the public into the construction area.
 - 3) Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by the Owner from fumes and noise.
 - 4) Maintain security by limiting number of keys and restricting distribution to authorized personnel.

3.4 CLEANING

- A. Clean in accordance with Specification Section – PROJECT CLOSEOUT.
 1. At all times, keep the premises free from accumulations of waste materials or rubbish caused by employees or the Work.
 2. Clean all soiled surfaces to remain immediately.
 3. At the completion of the Work, remove all rubbish from and about the building and all tools, scaffolding, and surplus materials and shall leave the Work "broom clean" or its equivalent.

END OF SECTION

SECTION 015723 – STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Provide all material, labor, equipment and services necessary to implement the Storm Water Pollution Prevention Plan (SWPPP).
2. Provide all material, labor, equipment and services necessary to comply with the conditions of the Construction General Permit (CGP) No. 2009-0009-DWQ.
3. Implement the Best Management Practices (BMP) contained within the SWPPP or implement other practices deemed necessary by the Contractor/Qualified SWPPP Practitioner (QSP) to better accomplish the intent of controlling the quality of runoff water from the Project Site.
4. Submit to the Owner/LRP all reports required for the Annual Report prior to September 1 of each year.

B. This Section does not include:

1. The Contractor's Qualified SWPPP Developer (QSD) will prepare the SWPPP.
2. A Notice of Intent (NOI) to be covered by the CGP will be electronically filed by the Owner/Legally Responsible Person (LRP) with the State Water Resources Control Board (SWRCB). The Owner/LRP will pay the NOI fee and annual fees thereafter when applicable.
3. If applicable, an Erosivity Waiver will be electronically filed by the Owner/LRP with the SWRCB. The Owner/LRP will pay the Erosivity Waiver fee.
4. The Annual Report will be electronically filed by the Owner/LRP with the SWRCB by September 1 of each year.
5. A Notice of Termination (NOT) to terminate the CGP coverage will be electronically filed by the Owner/LRP with the SWRCB at the end of the project upon final stabilization as determined by the owner's QSD.

C. Related Sections: The following Project Manual Sections contain requirements that relate to this section:

1. ALL DIVISION 00 SPECIFICATION SECTIONS.
2. ALL DIVISION 01 SPECIFICATION SECTIONS.
3. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
4. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Acronyms:

- | | |
|---------|---|
| 1. BMP | Best Management Practices |
| 2. CARB | California Air Resources Board |
| 3. CGP | Construction General Permit Order No. 2009-0009-DWQ |
| 4. COV | City of Visalia |
| 5. CSMP | Construction Site Monitoring Program |

6.	EPA	Environmental Protection Agency
7.	NOI	Notice of Intent
8.	NOT	Notice of Termination
9.	NPDES	National Pollution Discharge Elimination System
10.	QSD	Qualified SWPPP Developer
11.	QSP	Qualified SWPPP Practitioner
12.	SJVAPCD	San Joaquin Valley Air Pollution Control District
13.	SWPPP	Storm Water Pollution Prevention Plan
14.	SWRCB	State Water Resources Control Board
15.	TCFCD	Tulare County Flood Control District
16.	RWQCB	Regional Water Quality Control Board

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 - 1. Addenda to the SWPPP.
 - 2. Reports required by the SWPPP.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. COV City of Visalia
 - c. EPA Environmental Protection Agency
 - d. SJVAPCD San Joaquin Valley Air Pollution Control District
 - e. SWRCB State Water Resources Control Board
 - f. TCFCD Tulare County Flood Control District
 - g. RWQCB Regional Water Quality Control Board

PART 2 - PRODUCTS

2.1 SOURCE QUALITY CONTROL

- A. Storm Water Pollution Prevention Plan (SWPPP):
 - 1. The SWPPP shall be prepared in accordance with the guidelines contained in the CGP issued by the SWRCB under the National Pollution Discharge Elimination System (NPDES) permit program of the EPA.
 - 2. The intent of the CGP is to protect the quality of receiving waters of the United States by limiting the quantity of pollutants in rainfall runoff from construction sites of one acre or more in area. In order to accomplish this goal, each construction project is required to prepare a SWPPP that will govern construction activities to lessen the probability that pollutants will be present in rainfall runoff from their site.
 - 3. This site will be covered by the CGP by the time construction begins.

- a. All construction activity must comply with the conditions of the CGP.
 - b. A NOI to be covered by the CGP will be filed by the Owner/LRP with the SWRCB and the fees will be paid by the Owner/LRP.
 - c. Copies of the NOI will be provided to the Contractor to place in the appropriate Appendix of the SWPPP when the NOI is available.
4. The BMPs contained in the SWPPP will meet the intent of the CGP.
- a. The Owner does not have any responsibility for selecting or implementing the BMPs proposed by the Contractor and QSP to adequately control the quality of runoff from the site.
 - b. The Contractor and QSP must provide, implement, and carry out the BMPs that comply with the CGP regardless of the BMPs contained in the SWPPP.
 - c. The Contractor and QSP shall bear full responsibility for reviewing the proposed BMPs, ascertaining their ability to provide adequate controls, and implementing the BMPs or implementing others deemed by the Contractor and QSP to better accomplish the intent of controlling the quality of runoff water from the project site.
5. Tulare County Flood Control District (TCFCD)
- a. TCFCD is charged with the responsibility to monitor the quality of runoff received by their storm drain system. TCFCD is not the primary enforcement agency responsible for compliance with the NDPES permit. However, TCFCD can provide notice to the SWRCB that a violation is occurring and request that the SWRCB begin enforcement proceedings.

PART 3 - EXECUTION

3.1 APPLICATION

A. General Requirements:

1. The Contractor shall comply with the conditions of the CGP. The CGP is available at the following website:
www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml
2. The SWPPP is an aid to the Contractor in complying with the CGP.
3. Under the terms of this Contract, the Contractor is the Operator/Discharger of the Project Site. It is the Contractor's and QSP's responsibility to faithfully and fully implement the BMPs contained in the SWPPP, and other BMPs as required to effectively control the quality of runoff water from the project site.
4. The Contractor shall fully and completely carry out all provisions of the SWPPP and insure that all of the Contractor's forces, including sub-contractors, on the site do the same. The Contractor shall assume full responsibility for the implementation, maintenance and execution of the SWPPP for the life of this project. The Contractor shall be fully liable for penalties, fines, and clean-up costs resulting from the failure of the Contractor's personnel or subcontractor's personnel to comply with the provisions of the SWPPP, and hold the Owner/LRP harmless from the Contractor's failure to implement the SWPPP as required by the SWRCB, RWQCB, CGP, and the local authority having jurisdiction.

5. The Contractor shall be fully aware of the requirements for the full execution of the SWPPP which are contained in the previously mentioned regulations, the requirements of these specifications for implementing, maintaining, and enforcing the provisions of the SWPPP and the impact that the SWPPP will have on the operation, prosecution and cost of the work. A submittal of a bid on this project will be considered as prima facie evidence that the Contractor fully comprehends these requirements and impacts and has fully allowed for their effect on this project, both in time and cost.
6. The Owner/LRP's QSD shall prepare the Risk Determination, site map, and SWPPP for all construction activities that will occur on the project site. Prior to construction, the Contractor shall review the provided site map, mark any necessary changes due to their planned construction operations, and submit any revisions to the Owner/LRP's QSD. The QSD will amend the SWPPP as necessary and the Owner/LRP will certify the updated SWPPP on the SMARTS website.

B. Best Management Practices (BMPs):

1. The QSP shall conduct inspections weekly and at least once each 24-hour period during extended storm events, to identify and record BMPs that need installation or maintenance to operate effectively. Should the QSP deem the BMPs proposed in the SWPPP are inadequate to meet the requirements of the CGP, or a change occurs in the nature or manner of construction operations not anticipated in the SWPPP, the QSP shall propose alternative BMPs that are equal to or better than those contained in the SWPPP.
2. Should the Contractor implement alternative BMPs, he shall prepare all addenda to the SWPPP required by the CGP and notify the Owner's QSD for review of amendments to the original SWPPP.
3. Failure to implement the BMPs as required to meet the intent of the CGP and the SWPPP is a breach of state and federal laws. Punishment for breaking the law can result in fines and imprisonment.
4. BMPs shall be maintained from the start of construction until final stabilization.

3.2 FIELD QUALITY CONTROL

A. Monitoring of BMPs

1. Monitoring by QSP
 - a. Implement the CSMP (weekly, pre-storm, storm event, post-storm, quarterly inspections) as required by the CGP.
 - b. Conduct training and testing as required by the CGP.
 - c. Prepare and submit all reports to Owner/LRP and SWRCB as required by the SWPPP and the CGP. The Contractor is advised that the electronic filing of the Annual Report with the SWRCB by the Owner/LRP on behalf of the Contractor does not relieve the Contractor of any responsibility due to his failure to conduct proper inspection, testing, and training as required by the CGP. The Contractor shall bear full liability arising out of failure to conduct the required inspections, training, and testing detailed in the CSMP in the SWPPP.
2. Monitoring by Owner
 - a. The Owner will monitor the Contractor's implementation and maintenance of the BMPs.
 - b. Should the Owner determine that the Contractor's efforts fail to meet the requirements of the CGP, the SWPPP, and SWPPP amendments, the Owner reserves the right to employ any and/or all of the following actions:

- 1) Notify the SWRCB of the perceived failure of the Contractor to comply with the CGP and SWPPP.
- 2) Withhold an amount of money from the Contractor's Payment Request, equal to the Owner's estimate of the value of the work required to implement and maintain the required BMPs, as well as, provide the required inspection, training, and testing forms.
- 3) Hire a separate QSP to perform the work required to implement the CSMP and deduct the costs thereof from the Contractor's Payment.

B. Availability and access to the SWPPP

1. The Contractor shall keep a minimum of one copy of the SWPPP and Addenda thereto in the following locations:
 - a. Contractor's Project Site Field Office.
 - b. Contractor's General Business Office.
2. The SWPPP shall be available for public inspection at any time during normal business hours.

3.3 CLEANING AND REMOVAL

A. Removal of BMPs

1. Completely remove from the Project Site all materials used to construct and maintain the temporary BMPs upon completion and acceptance of the Project.
2. Remove all accumulated debris and excess material from the BMPs and surrounding locations, and broom clean all adjacent hardscape surfaces to the satisfaction of the Owner.
3. All permanent BMPs shall remain on the Project Site. The Owner will be responsible for ongoing inspection and maintenance after final acceptance.

- B.** Under written agreement and with the approval of the Owner, the Contractor may assign maintenance and removal responsibilities of the project BMPs to a subsequent contractor for later work phases at the Project Site.

3.4 RECORD KEEPING

- A.** Paper or electronic records of all CSMP inspections, testing, and training reports, including the Annual Report, shall be retained for a period of at least three years. These records shall be available at the project site until construction is completed.

3.5 PAYMENT

- A.** Full compensation for all costs involved in implementing, and monitoring the implementation of the SWPPP for this project, including inspections, testing, and training, performing corrective measures as required to better implement the SWPPP, providing all labor, materials, and resources to maintain the SWPPP and all required records of the SWPPP, and being full liable for all failures to fulfill the intent and requirements of the CGP set forth by the SWRCB, shall be included in the cost bid for the various items of work and no additional payment will be made therefore.

END OF SECTION

SECTION 01 5725 - STORM WATER POLLUTION PREVENTION PLAN

PART 1 - GENERAL

1.1 SUMMARY

- A. The State Water Resources Control Board (SWRCB) regulates storm water discharges associated with construction and land disturbance activities. Certain projects are required to obtain permit coverage under California's Construction General Permit (CGP), Order 2009-0009-DWQ. A site-specific Storm Water Pollution Prevention Plan (SWPPP) is required to obtain permit coverage under the CGP.
- B. The Central Valley Regional Water Quality Control Board, Region 5F (RWQCB) is the Regional Board responsible for inspections, if any, and enforcing the CGP.
- C. Related Sections
 - 1. Earthwork 31 200
- D. The Owner or Owner's agent will be responsible for filing the Notice of Intent (NOI) and obtaining permit coverage, and developing a site-specific SWPPP.
 - 1. The Contractor shall assist the owner in completing the NOI by providing information requested by the owner or the owner's agent.
 - 2. The Owner has prepared and paid for the Storm Water Pollution Prevention Plan (SWPPP) and this plan is issued with these Contract Documents as an attachment. The entire SWPPP document can be made available either in draft format or final format at the request of the Contractor. The entire SWPPP will be made available for the Contractor to retain on the construction site prior to the scheduled commencement of construction activities.
 - 3. This project is a Risk Level 1 project. All provisions of Attachment C of the CGP shall apply to this project.
- E. Nothing in this section shall preclude the Contractor, the Contractor's QSP, or other subcontractors from fully complying with applicable provisions of the CGP.

1.2 REFERENCES

- A. National Pollution Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, Order No. 2009-0009-DWQ, NPDES No. CAS000002.
- B. Applicable amendments and/or modifications to Order No. 2009-0009-DWQ
- C. California Stormwater Quality Association (CASQA) BMP Handbook, November 2009

1.3 QUALITY ASSURANCE

- A. The individual responsible for implementing the SWPPP in accordance with the CGP must be a Qualified SWPPP Practitioner (QSP) for this project and hold such certification from CASQA.
- B. The Contractor's QSP shall have an active online account on the State Water Resources Control Board's Storm Water Multiple Application & Report Tracking System (SMARTS).
- C. Install BMPs as directed on the Water Pollution Control Drawing at the appropriate time, and maintain during construction. Remove and replace any damaged or ineffective BMPs.
- D. The QSP should use his or her discretion to implement additional BMPs as necessary that may or may not be called out specifically in the SWPPP, and to ensure the construction site complies with the CGP.
- E. The QSP shall be responsible for notifying the Qualified SWPPP Developer (QSD) of any significant discrepancies between the Drawing(s) and the actual site conditions. The QSD will make revisions to the SWPPP and issue amendments as applicable. Upon receiving amendments or other revised documents, the QSP shall be responsible for inserting these documents into the SWPPP and keeping them through the life of the Construction project.
- F. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.

1.4 SUBMITTALS

- A. The Contractor shall submit a copy of the QSP's certificate no later than 1 week prior to the commencement of construction activities.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Erosion control products shall comply with those products named in Section 01 5710
- B. Provide materials, not specifically described but required for proper completion of the work of this Section, as selected by the Contractor, subject to approval of the Architect.
- C. Specific materials shall comply with the Erosion Control Plan/Water Pollution Control Drawings and should comply with the applicable BMP Fact Sheets in the CASQA BMP Handbook.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the site and the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work.

3.2 IMPLEMENTATION

- A. The QSP shall implement the SWPPP in accordance with the Contract Documents and as required in the CGP.
- B. The SWPPP Binder(s) and other Storm Water Pollution Prevention Documents shall be kept on the construction site at all times. It shall be made readily available for a RWQCB inspector.
- C. The construction schedule shall be inserted into the SWPPP Binder and any subsequent revisions to the construction schedule.
- D. The QSP shall be responsible for conducting and documenting all training activities in accordance with the CGP. The documentation of the training activities shall be inserted and kept in the project SWPPP. The training activities shall consist of:
 - 1. Training for individuals responsible for all activities associated with the CGP (i.e. general contractor, site superintendents and subcontractors)
 - 2. Training for all individuals responsible for BMP installation, inspection, maintenance and repair
- E. The QSP shall be responsible for coordinating with the Legally Responsible Person (LRP), or Owner to be added to as a Data Entry Person on the LRP's SMARTS account.
- F. The Contractor's QSP shall be responsible for completing and filing all annual reports on SMARTS and shall coordinate with the LRP for necessary certifications. Annual Reports shall be submitted no later than September 1st of each compliance year. The QSP shall complete and file all annual reports as required by the CGP.
- G. The QSP shall be responsible for responding to any Notice of Violations (NOVs) or Staff Enforcement Letters (SELs) that may be issued by the RWQCB for non-compliance. The Contractor's QSP shall also be responsible for responding to the RWQCB and preparing any technical reports or other documents that may be requested by the RWQCB.
- H. The QSP shall file a Notice of Termination on the SMARTS website no later than 30 days from the completion of the project.
- I. If delays in construction occur that cause construction to continue beyond the contracted end date, that are solely the responsibility of the Contractor, the Contractor shall be held responsible for additional costs associated with implementing the SWPPP in accordance with the CGP, and any fines levied by the Regional Water Quality Control Board.

- J. At the termination of construction activities and after the Notice of Termination has been approved by the SWRCB, the Contractor shall be responsible for delivering the SWPPP, including all amendments, inspections forms and any other documents added during the course of construction to the Architect.

3.3 FIELD QUALITY CONTROL

- A. The Contractor and the Contractor's QSP shall be responsible for ensuring all subcontractors on the site comply with the SWPPP and the CGP and their individual actions do not result in any enforcement actions. The Contractor shall be liable for non-compliance fines from the RWQCB or SWRCB.
- B. All construction trades, including their supplies who enter the construction site shall comply with the Good Housekeeping Measures named in Section B of Attachment C of the CGP.
- C. Upon commencement of construction, a rain gauge shall be installed on the site in a prominent location where it will not be shielded from rainfall.
- D. Install BMPs where noted on the Drawing(s) and maintain as required by the CGP throughout the life of the construction project. BMPs shall be replaced at the discretion of the QSP to comply with the CGP.
- E. At the end of each workday all stockpiles shall be covered and protected around their perimeter.
- F. All trash and debris shall be cleaned up and properly disposed of at the end of each work day.
- G. The QSP or an individual under the direct supervision of the QSP shall conduct all inspections, maintenance repair and sampling activities. Records of inspections shall be kept using a form provided by the SWRCQ, RWQCB, CASQA, or another alternative format.
- H. Upon identification of BMP failures or shortcomings during inspections, effective remedies shall be implemented within 72 hours of identification.

END OF SECTION 01 5725

SECTION 016400 – OWNER-FURNISHED ITEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all materials, labor, equipment, and services necessary to prepare for installation for those items, noted or scheduled within the Contract Documents, indicated as follows:
 - a. CFCI - Contractor Furnished, Contractor Installed
 - b. OFCI - Owner Furnished, Contractor Installed
 - c. OFOI - Owner Furnished, Owner Installed

 - B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

- A. Unless otherwise defined in the GENERAL CONDITIONS, the following definitions apply for this project:
1. CFCI: CONTRACTOR FURNISHED, CONTRACTOR INSTALLED
 - a. When and if the indication "CFCI" is noted on the drawings or listed in the specifications, such items are shown or listed for information and will be furnished by and installed by the Contractor. Such a designation is listed only for clarity, in order to set the item(s) apart from the OFCI, OFOI, and OFVI related item(s).
 - b. All item(s) shown or listed in the drawings and specifications without any indication are in the Contract and are part of the Work unless specifically noted otherwise.
 2. OFCI: OWNER FURNISHED, CONTRACTOR INSTALLED
 - a. When and if the indication "OFCI" is noted on the drawings or listed in the specifications, such item(s) are shown or listed for information and will be furnished by Owner and installed by the Contractor. The Contractor shall coordinate and verify all dimensions and details necessary for the proper installation.
 3. OFOI: OWNER FURNISHED, OWNER INSTALLED
 - a. When and if the indication "OFOI" is noted on the drawings or listed in the specifications, such item(s) are shown or listed for the purpose of general information and will be furnished and installed by Owner. The Contractor shall coordinate and verify all dimensions and details necessary for proper installation.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

1. Coordination Drawings:
 - a. Submit installer's coordination drawings or other documents indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.
 - b. The Owner will provide Product Data, Shop Drawings, Piping and Wiring Diagrams, Catalog Data Sheets for any items provided under this Specification Section.
2. Closeout Submittals in accordance with Specification Sections in Division One:
 - a. Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
 1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA). Regulatory changes may affect the formulation, availability, or use of the specified coatings. Confirm availability of coatings to be used prior to use, and notify the Architect of any recent changes in the Local California Air District Standards where the Project is located, that may have occurred after the preparation of this specification section.
- B. Meetings:
 1. Progress Meetings: Scheduled by the Contractor for the proper performance of the work.
 - a. Minimum agenda shall be to review the work progress; discuss field observations, problems, and decisions; identification of any potential problems which may impede planned progress; corrective measures to regain projected schedules; and maintenance of quality and work standards in accordance with manufacturer's warranty requirements.
 2. Final Inspection: Scheduled by the Contractor upon proper completion of the work.
 - a. Minimum agenda shall be a walkover inspection to identify problems which may impede the issuance of any warranties or guarantees, and discussion of maintaining the work until substantial completion notice for the project is filed.
 3. Participants (or designated representative of) invited to attend each of the above meetings shall be as follows:
 - a. Contractor.
 - b. Owner.
 - c. Architect.
 - d. Installer.
 - e. Material Manufacturer(s).
 - f. Subcontractors, as appropriate (including any accessory subcontractors).

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:

1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage. Damaged products will not be accepted. Contractor shall inspect prior to unloading, for any damaged goods, and if OK, will allow unloading and be responsible for the goods.

B. Acceptance at Site:

1. The Contractor shall accept delivery of any items and the responsibility for all items to be furnished to him by the Owner.

C. Storage and protection:

1. Owner Furnished Equipment: The Owner will coordinate and inform the Contractor as to delivery dates for Owner Furnished Equipment to the Project Site. The Contractor shall be responsible for unloading, uncrating, and protecting such equipment.
2. When only a supporting device, or sub-assembly is to be installed by the Contractor the Owner shall provide only that portion and shall store and safeguard those portions to be installed later by others.
3. All products shall be protected, handled, and stored in complete compliance with the manufacturer's printed instructions to protect the Owner from warranty infringements or loss of the full function of the item specified.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

A. Existing Conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Examine all preparatory work to determine its suitability and completeness. Notify the responsible Contractor of any deficiencies which must be corrected prior to installation.
3. Be satisfied that all conditions affecting installation, operation or function are suitable for installation of the items scheduled.
4. After installation, and acceptance by the inspector and the Architect, the Contractor shall provide protective guards, covers or barricades as required by the manufacturer.
5. The Contractor shall promptly repair, refurbish, or replace items damaged by his operations to a condition satisfactory to the Owners representatives and at no cost to the Owner.

1.7 WARRANTY

1. The Contractor shall provide access to the installed items or prepared substrates for the inspection of the manufacturers representatives, for the purpose of affirming the warranties scheduled.
2. All work shall be performed in full accordance with the manufacturers warranty requirements and all governing codes.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
 - a. Prepare all substrate blocking as required by the items Furnished By Owner.
 - b. Prepare all wiring and piping connections as required by the items Furnished By Owner.
- B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
- C. Surface preparation:
1. Prepare surface in accordance with manufacturer's instructions and recommendations.
 2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond or installation of materials specified within the Contract Documents.

3.2 INSTALLATION

- A. General:
1. In accordance with manufacturer's instructions and recommendations unless specifically noted otherwise.
 2. In accordance with approved submittals.
 3. In accordance with Regulatory Requirements.
 4. Set plumb, level, and square.
- B. Layout:
1. Lines shall be straight and true.
- C. Material and Equipment to be installed:
1. All items so noted or scheduled to be OFCI shall be unloaded, completely installed and placed in operable condition under this Contract.

3.3 CLEANING

- A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces at the end of each day, minimum.
 2. In accordance with manufacturer's instructions and recommendations.

3.4 SCHEDULES

- A. This schedule is provided for the convenience of the General Contractor for items not scheduled elsewhere on the drawings or in the Specification Sections. Refer to Drawings for additional items not listed below:
1. Mrytha Pool Vessel (Base Bid) OFCI.

OWNER-FURNISHED ITEMS

2180

- a. The Contractor shall contact the District Vendor and create a list of schedule activities that are to be included in the Contractors Schedule.
 - 1) Contact: Myrtha Pools USA, Sébastien Rousseau, OLY. Western Regional Sales Manager, C 352-283-1459, M sebastien.rousseau@myrthapools.com.
 - b. The Myrtha pool parts will arrive in Sea-Trane containers, and the Contractor shall offload and securely store the materials. The containers must be unloaded upon arrival, the containers are not left on site. Unloading should be typically simple because everything is loaded onto pallets. These pallets can either be moved into the Contractors own containers. The contractor will be responsible for the live offload and storage.
2. Sports Lighting (Base Bid) OFCI.
- a. The General Contractor shall coordinate the schedule and work with the Districts Vendors.
 - b. The materials will be delivered to the site, FOB.
 - c. The Contractor shall off-load the materials and place them in an area approved by the District.
 - d. The Contractor shall fence and protect the materials.
 - e. The Contractor will provide all labor to install these items, unless noted otherwise.

END OF SECTION

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SECTION 017123 – FIELD ENGINEERING

PART 1 - GENERAL

1.1 SUMMARY

1. This section includes the following: Section includes requirements governing execution of the work including, but not limited to, the following:
 - a. Construction layout
 - b. Field engineering and surveying

- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 1. ALL DIVISION 00 SPECIFICATION SECTIONS
 2. ALL DIVISION 01 SPECIFICATION SECTIONS
 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP
 5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

- A. Submit in accordance with specification section – SUBMITTAL PROCEDURES:
 1. Coordination Drawings:
 - a. Utility Coordination Drawing(s)
 2. Quality Assurance/Control Submittal:
 - a. Qualification Data for Civil Engineer/Surveyor
 - b. Intermediate Certificate of Survey Compliance
 - c. Final Certificate of Survey Compliance
 3. Closeout Submittals in accordance with the following:
 - a. As-built Survey Drawing(s)
 - b. Project "Record" Survey Drawing

1.3 QUALITY ASSURANCE

- A. Qualifications:
 1. Civil Engineer/Surveyor Qualifications:
 - a. A professional Civil Engineer or Land Surveyor who is licensed to practice in the State of California.
 - b. Has successfully completed three (3) projects of similar scope and size to that indicated for this project.

- B. Regulatory Requirements:
 1. In accordance with Specification Section – REGULATORY REQUIREMENTS and the following:

- a. CARB Materials and equipment used for this project shall comply with the current applicable regulations of the California Air Resources Board and the Environmental Protection Agency (EPA), in the area where the project is located.
- b. CF County of Fresno, codes and ordinances

C. Certificates:

- 1. Intermediate Certificate of Survey Compliance:
 - a. Provide certification letter on contractor's letterhead stating the project complies with the requirements of the contract documents at the completion of building pad construction and installation of underground utilities outside of building pads is complete. Certification letter must be stamped and signed by the qualified Civil Engineer/Surveyor.
- 2. Final Certificate of Survey Compliance:
 - a. Provide certification letter on contractor's letterhead stating the project complies with the requirement of the contract documents at the completion of all above ground improvements and finish grading.

D. Meetings:

- 1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with all other related work.
 - b. Identify any potential problems, which may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
- 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems, which may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been filed.

1.4 PROJECT CONDITIONS OR SITE CONDITIONS

A. Existing Conditions:

- 1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions:

1. The existence and location of underground utilities indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence, location, and elevation of all underground utilities and other construction affecting the Work.
 - a. Call a local utility locator service (such as USA – "Underground Service Alert") for the task of locating any project related utilities.
 - b. Verify the location and invert elevation at points of connection of sanitary sewer system and storm drainage system.
 - c. Accurately document vertical and horizontal measurements and elevations uncovered or verified.

B. Coordination:

1. Before proceeding to lay out the Work, verify layout information shown on the drawings in relation to the property survey, topographic survey, and existing benchmarks.
2. Drawings have been provided showing improvements and underground systems for foundations, storm drainage, sewer, water, gas, mechanical lines, electrical lines, and site improvements. Coordinate and verify the accuracy of the drawing locations and elevations as they relate to each other, with existing utility lines, and building pad earthwork zones of influence.
 - a. Provide 1"=20' scaled and dimensioned Utility Coordination Drawing.
 - b. No improvements shall be executed until the Utility Coordination Drawing is reviewed by the Architect for general conformance with the Contract Documents.
3. Coordinate Layout of Work performed under other sections of the Specifications.
4. If layout conflicts are encountered, report to Architect and then prepare recommendation(s) for correction.
5. Close and careful coordination is required between work of the Contract and that of any future work to follow.
6. Work under this Contract shall accommodate the installation of future work.

3.2 PREPARATION

A. Existing Utility Information:

1. Furnish information to public utilities 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 authorities having jurisdiction.

3.3 CONSTRUCTION

A. Layout of Work:

1. Engage a Civil Engineer/Surveyor to Layout the Work using accepted surveying practices and be responsible for all reference points, benchmarks, lines, elevations, and measurements required for Work under this Contract.
2. Reference points:

- a. Locate existing permanent benchmarks, control points, and similar reference points before beginning the work.
 - b. Do not change or relocate existing benchmarks or control points without approval of the Architect.
 - c. Replace lost or destroyed permanent benchmarks and control points. Base replacements on the original survey control points.
3. Benchmarks:
- a. Establish and maintain a minimum of two (2) permanent benchmarks on the project site, referenced to data established by survey control points.
 - b. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - c. Use established benchmarks and control points to set lines and levels at each floor of construction and elsewhere as needed to locate each element of the Project.
4. Locate construction access to site parking, storage areas, and temporary facilities and controls.
5. Locate and layout control lines and levels for structures, foundations, column and wall grids, and floor levels including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels.
- a. Level foundations and piers from two or more locations.
6. Locate and layout site improvements, including pavement, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
7. Inform installers of lines and levels to which they must comply.
8. Check the location, level, and plumb of every major element as the Work progresses.
9. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.4 FIELD QUALITY CONTROL

- A. 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 the Inspector and Architect.
- B. Maintain As-built Survey Drawing(s) of all underground, surface, and above ground improvements and grades with measurements for both vertical and horizontal dimensions.
 1. Record all addendum and issued change documents.
 2. Upon project completion stamp and sign As-built Survey Drawing(s).
- C. Check documented measurements and elevations at completion of building pads and underground utilities against contract documents. The Contractor shall correct out of compliance Work before proceeding with the next element of Work. As-built Survey Drawing(s) shall be current. When all Work at this stage is in compliance with the contract documents, issue the Intermediate Certificate of Survey Compliance.
- D. Check documented measurements and elevations at completion of finish grading and site improvements, except for landscape and irrigation work, against contract documents. The Contractor shall correct out of compliance Work before proceeding with the next element of Work. As-built Survey Drawing(s) shall be complete. When all Work at this stage is in compliance with the contract documents, issue the Final Certificate of Survey Compliance.

- E. The Civil Engineer/Surveyor shall prepare Project "Record" Survey Drawing in accordance with Specification Section - PROJECT DOCUMENTS.
 - 1. The Project "Record" Survey Drawing shall contain all of the vertical and horizontal measurements and elevations of reference points, benchmarks, utility lines, grade contours, grade breaks, building floors, major vegetation, and sitework improvements.
 - 2. The Project "Record" Survey Drawing shall be stamped and signed by the qualified Civil Engineer/Surveyor.
 - 3. The As-built Survey Drawing(s) shall used in preparation of the Project "Record" Survey Drawing.

3.5 PROTECTION

- A. Preserve and protect permanent benchmarks, control points, reference points, and staking during construction operations.

END OF SECTION

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SECTION 017329 – CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary for cutting and patching existing materials, accessories and other related items necessary to remodel the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of Work.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 - 1. Coordination Drawings:
 - a. Submit any installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.

1.4 QUALITY ASSURANCE

- A. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades.
 - 1. Review areas of potential interference and conflict.
 - 2. Coordinate procedures and resolve potential conflicts before proceeding.
- B. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

- C. 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 results in increased maintenance or decreased operational life or safety.
- 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. The Contractor shall do all cutting, fitting or patching of existing construction and his work as may be required to make the several parts come together properly and ready to receive or be received by work of other contractors as shown, or reasonably implied by the drawings and specifications for the completed structure. All work shall be as directed by the Architect to achieve the intended work and degree of finish shown.
- F. Any cost caused by defective or ill-timed work shall be borne by the party responsible therefor.

1.5 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid interruption of services to occupied areas.

3.3 FIELD QUALITY CONTROL

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete or Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill. **Do not overcut concrete corners** – hand chip all corners to prevent over-cutting lines. Cut any masonry pavers at grout lines, and **don't overcut** into adjacent brick that is to remain.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- C. Grinding and Sandblasting: Where grinding and sandblasting is required of existing construction, perform in accordance with industry standards for proper preparation of new construction or finishes.

- D. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. All hard paving and walk replacement shall be flush with adjacent existing construction. Compact existing subgrade so that there is no settling of adjacent horizontal surfaces greater than 1/4", and that all surfaces are ADA compliant.
 - b. When altering surfaces in brick paving, match nearby adjacent horizontal concrete surfaces in color and texture. Take care to protect adjacent brick surfaces from concrete slurry and finishing operations. Clean exposed surfaces of brick immediately so that no signs of adjacent concrete work is seen.
 - c. Match existing adjacent exposed aggregate concrete paving (color and texture) when construction is proposed for areas paved with exposed aggregate concrete.
 - d. Match existing adjacent colored concrete paving (color and texture) when construction is proposed for areas paved with colored concrete.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

END OF SECTION

SECTION 017419 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Requirements governing execution of the work including, but not limited to, the following:
 - a. Salvaging non-hazardous demolition waste.
 - b. Recycling non-hazardous construction and demolition waste.
 - c. Disposing of non-hazardous construction and demolition waste.

- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP
 - 5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP

1.2 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, modernization, remodeling, renovation, or repair operations. Construction waste includes packaging.

- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition and site clearing operations.

- C. Disposal: Removal off-site of construction and demolition waste and subsequent sale, recycling, reuse, or deposit in landfill acceptable to authorities having jurisdiction.

- D. Recycle: Recovery of construction or demolition waste for subsequent processing in preparation for reuse.

- E. Salvage: Recovery of construction or demolition waste and subsequent sale or reuse in another facility.

1.3 SYSTEM DESCRIPTION

- A. Performance Requirements
 - 1. General:
 - a. Achieve end-of-project rate for salvage/recycling of minimum 65percent by weight of total non-hazardous construction and demolition waste generated by the Work.

- b. Practice efficient waste management in the use of materials in the course of the Work.
- c. Use all reasonable means to divert construction demolition waste from landfills and incinerators.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section – SUBMITTAL PROCEDURES:
 - 1. Quality Assurance/Control Submittal:
 - a. Waste Management Plan
 - b. Waste Management Progress Reports

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. In accordance with Specification Section - REGULATORY REQUIREMENTS and the following:
 - a. CARB Materials and equipment used for this project shall comply with the current applicable regulations of the California Air Resources Board and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. CAL/OSHA California Division of Occupational Safety and Health Administration.
 - c. CF County of Fresno, codes and ordinances
 - d. EPA Environmental Protection Agency
- B. Waste Management Plan:
 - 1. Prior to commencing the Work, submit Waste Management Plan. The Plan must include, but not limited to, the following:
 - a. Contractor's name and project identification information.
 - b. Procedures to be implemented.
 - c. Materials to be salvaged, recycled, or disposed.
 - d. Estimated quantities of material broken down by material categories.
 - e. Names and locations of entities who receive salvaged and recycled materials.
 - f. Tonnage calculations that demonstrate that the Contractor will salvage, re-use, or recycle the minimum percentage by weight of the construction and demolition waste materials generated by the Work.
- C. Waste Management Progress Reports:
 - 1. Submit the Report with each application for progress payment.
 - a. Failure to submit the Report and its supporting documentation can render the application for progress payment incomplete and delay the progress payment.
 - 2. Each Report must include, but not limited to, the following:
 - a. List of material categories.
 - b. Weight quantity of waste by material category.
 - c. Weight quantity of waste salvaged.
 - d. Weight quantity of waste recycled.
 - e. Total weight quantity of salvaged and recycled waste by material category.
 - f. Weight percentage of waste salvaged and recycled by material category.

- g. Include manifests, weight tickets, receipts, and invoices specifically identifying the salvaged, reused, and recycled materials.
- h. Signature line for Contractor.

D. Meetings:

- 1. Pre- Demolition.....Scheduled prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems, which may impede the proper disposal of materials.
 - c. Review areas where waste and recycle bins will be located.
 - d. Review where salvaged materials will be stored.
 - e. Review demolition waste disposal and material recycling procedures and environmental goals per Waste Management Plan with all subcontractors and waste haulers.
- 2. Progress:.....Scheduled by the Contactor during the performance of the work.
 - a. Review for maintaining proper procedures.
 - b. Inspect and identify any problems and acceptable corrective measures.
- 3. Completion:.....Scheduled by the Contactor upon proper completion of the work.
 - a. Inspect and identify any problems.
 - b. Submit final Progress Report summarizing total construction and demolition waste weights, percentages salvaged, recycled, and disposed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Cleaning, handling, and packing:

- 1. Salvaged Items shall be handled in such a manner as to assure that they are free from damage.
- 2. Salvaged Items shall be cleaned and packed or cleaned and palleted before off-site transport.

B. Storage and protection

- 1. Salvaged Items shall be stored in a dry, protected area prior to transport.
- 2. Cover with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 PROJECT CONDITIONS

A. Environmental requirements;

- 1. Comply with federal, state, and local regulations pertaining to solid waste, recycling, chemical waste, sanitary waste, and noise pollution.
- 2. Perform work in a manner as to minimize the spread of dust and flying particles.
- 3. No burning will be allowed on-site.

B. Existing conditions:

- 1. Examine project site and building(s) and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

2. Conduct work so as not to interfere unnecessarily with adjacent buildings, roads, streets, drives, and walks.
 - a. Do not close or obstruct streets, alleys, walks, or passageways without permission from authorities having jurisdiction and coordinating same with immediate neighbors whose business operation may be affected.
 - b. Safety measures shall be taken to insure an uninterrupted flow of traffic around the site as required by local Police and Fire Departments
3. Storage or sale of removed items on-site is not permitted.
4. It is not expected that hazardous materials will be encountered in the Work.
 - a. Hazardous materials will be removed and disposed of by Owner prior to start of the Work.
 - b. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner.
5. Hazardous materials are present in buildings and structures to be selectively demolished. The Owner has prepared a report for the Contractor to review and use.
 - a. Hazardous material remediation is specified in Specification Section - **HAZARDOUS MATERIAL PROCEDURES.**

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Furnish all materials, tools, equipment, facilities, and services as required for performing the construction and demolition waste disposal work.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of conditions:
 1. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 2. Execution of work under this specification section shall constitute acceptance of existing conditions.
 3. Obtain all necessary permits and authorizations by regulatory agencies required to perform the Work under this Section.

3.2 PREPARATION

- A. Coordination:
 1. Before proceeding, verify plans match existing conditions.
 2. Review documents of existing construction provided by Owner against existing conditions.
 3. If conflicts are encountered, report it to the Architect. Then prepare recommendation(s) for correction and submit to Architect for review.

4. Coordinate work under this specification section with work specified under other sections.

B. Protection:

1. Property:
 - a. Provide temporary weather protection to prevent damage to salvage and recycled items.
 - b. All damage inflicted on public and private property and the property of the Owner shall be repaired or restored to the original condition prior to the start of this Work. All repair or replacement work shall be done at no additional cost to the owner.

3.3 IMPLEMENTATION

A. General:

1. Implement waste management plan as submitted.
2. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the contract.
3. Designate and label specific areas on project site necessary for separating materials that are to be salvaged, recycled, reused, and donated.

B. Demolition Waste:

1. Salvaged items for delivery to Owner or other entity:
 - a. Clean salvaged items.
 - b. Pack or crate items after cleaning. Identify contents of containers.
 - c. Store items in a secure area until pick-up or delivery to Owner.
 - d. Transport item to Owner's storage area off-site.
 - e. Protect items from damage during transport and storage.
2. Salvaged items for reuse in the work:
 - a. Clean salvaged items.
 - b. Store items in a secure and dry area until ready for installation.
3. Recyclable materials:
 - a. Prepare and maintain recyclable waste materials according to recycling facility requirements.
 - b. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
 - c. Separate recyclable demolition waste from other waste materials. Separate recyclable waste by material type at project site to the maximum extent practical according to approved waste management plan.
 - d. Separate recyclable demolition waste from other waste materials. All recyclables may be co-mingled into one bin and separated off-site at the appropriate recycling facility.
 - 1) Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from the project site.
 - 2) Include a list of acceptable and unacceptable materials at each container or bin.
 - 3) Inspect containers and bins for contamination and remove contaminated materials if found.
 - 4) Processed materials stockpiled on site shall not be mixed with other materials. Shape stockpiles to drain surface water. Cover stockpiles to prevent windblown dust.

- 5) Processed material shall be stockpiled away from construction. Do not stockpile within drip line of remaining trees.
 - e. Remove recyclable demolition waste off project property and transport to recycling receiver or processor.
 - f. The following list is of common material types which can be recycled. The list of material types is in no way complete but is representative of materials that can be sorted and recycled as per the intent of this specification section.
 - 1) Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
 - 2) Wood: Sort and stack members according to size, type, and length of member.
 - 3) Metals: Separate metal by type. Stack structural steel members according to size and length. Remove bolts, nuts, washers, and other hardware from members.
 - 4) Gypsum Board: Stack large clean pieces on wood pallets in a dry location. Remove edge trim and sort with other metals.
 - 5) Acoustical Ceiling Tile: Stack large clean pieces on wood pallets in a dry location.
 - 6) Metal Suspension System: Separate metal members including trim and other metals from acoustical ceiling tile and sort with other metals.
 - 7) Carpet: Roll large pieces tightly after removing debris, trash, adhesive, and any tack strips. Store carpet in a dry location.
 - 8) Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
 - 9) Conduit: Reduce conduit to straight lengths and store by type and size.
 4. Site clearing waste:
 - a. Excavated top soil and land clearing debris not recycled and reused on-site shall be removed to an off-site recycling location or disposed of at a landfill that accepts inert material.
- C. Construction Waste:
1. Recyclable materials:
 - a. Prepare and maintain recyclable waste materials according to recycling facility requirements.
 - b. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
 - c. Recycle paper and beverage containers used by on-site workers.
 - d. Separate recyclable construction waste from other waste materials. Separate recyclable waste by material type at project site to the maximum extent practical according to approved waste management plan.
 - e. Separate recyclable construction waste from other waste materials. All recyclables may be co-mingled into one bin and separated off-site at the appropriate recycling facility.
 - 1) Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from the project site.
 - 2) Include a list of acceptable and unacceptable materials at each container or bin.
 - 3) Inspect containers and bins for contamination and remove contaminated materials if found.

- f. Remove recyclable construction waste off project property and transport to recycling receiver or processor.
- g. The following list is of common material types which can be recycled. The list of material types is in no way complete but is representative of materials that can be sorted and recycled as per the intent of this specification section.
 - 1) Cardboard Packaging: Breakdown into flat sheets. Bundle and store in a dry place.
 - 2) Polystyrene Packaging: Separate and bag materials.
 - 3) Pallets: As much as possible, require deliveries using pallets to remove pallets from the project site. For pallets that remain on-site, breakdown pallets into component wood pieces and comply with requirements for recycling wood.
 - 4) Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
 - 5) Wood: Clean cut-Offs of lumber and grind or chip into small pieces.
 - 6) Gypsum Board: Stack large clean pieces on wood pallets in a dry location.

D. Disposal of Waste:

- 1. Except for items or materials to be salvaged, recycled, or otherwise reused remove and transport waste materials from project site and legally dispose of them in a manner acceptable to authorities having jurisdiction.
- 2. Do not allow waste material to accumulate on site.
- 3. Transport waste in a manner that will prevent spillage on adjacent surfaces and areas.

3.4 CLEANING

- 1. Clean in accordance with Specification Section – PROJECT CLOSEOUT:
 - a. Immediately clean any soiled surfaces to remain.

END OF SECTION

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SECTION 017720 – PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.
- C. Work Included:
1. Project cleanup and coordination of all cleaning work required under all sections of this specification.
 2. Collection of and processing for delivery to the Architect of all Project Record Drawings required under this and other various Sections of the Specifications.
 3. Compile and assemble all required documents, operation data, maintenance manuals, and parts lists for all equipment items provided for this project.
 4. Start-up of all mechanical, electrical, and miscellaneous equipment items; and adjustment required for the performance specified.
 5. Compile and assemble all guarantees, warranties, or other written documentation to establish the requirements outlined under all sections of this specification.
 6. Repair and touch-up on all items damaged during the construction and handling processes.
 7. Furnish maintenance material and spare parts as specified within DIVISIONS 02 through 49 of these specifications.
 8. Deliver to the Architect all assembled copies of those items required in Articles 1 through 6 above for presentation to the Owner.
- D. It shall be the responsibility of the Contractor to provide all labor and materials necessary to achieve completion of the items listed under Paragraph A, B and C above, although certain items may be specified under the work of other trades. Periodic removal of debris, cleaning, repair, and testing of times in various areas of the construction site shall be carried out under the direction of the Contractor.

1.2 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

1. Quality Assurance/Control Submittals:
 - a. Design Data.
 - 1) All design data as required by the Contract Documents.
 - b. Test Reports:
 - 1) Submit four (4) copies of reports.
 - 2) Submit four (4) copies of reports required by regulatory requirements.
 - 3) Submit four (4) copies of ICC Evaluation Service Report.
 - 4) Submit four (4) copies of Testing Laboratory's report.
 - 5) All other Test Reports as required by the Contract Documents.
 - c. Certificates:
 - 1) Submit three (3) copies of certificates.
 - d. Manufacturer's Instructions:
 - 1) Submit three (3) copies of manufacturer's instructions.
 - e. Manufacturer's Field Reports:
 - 1) Submit three (3) copies of manufacturer's field reports.
 - f. Engineering Calculations:
 - 1) Submit four (4) copies of engineering calculations computed and signed by a registered Civil or Structural Engineer in the State of California.
2. Closeout Submittals in accordance with Specification Sections in Division One:
 - a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - c. Warranty in accordance with Specification Section - WARRANTIES.
3. Project Record Documents:
 - a. Various Sections of the detailed specifications require Project Record Drawings to be prepared by the Contractor(s). These drawings shall be collected by the Contractor, checked for conformance to the specific requirements, and when completed, delivered to the Architect. The Contractor shall also be responsible for collecting bound operating and maintenance manuals required of all trades supplying equipment, and for delivering them to the Architect.
4. Documents Required for Project Certification
 - a. Compile and neatly assemble with indexed and labeled tabs, three (3) sets of the required documents for project certification by the State Agencies. The required documents include, but are not limited to, the following;
 - 1) Document Required List "Form" for Project Certification ORS-6.
 - a) This document shall be used to organize and index the required documents.
 - 2) Project Information "Forms":
 - a) Project Site Inspector(s) SSS-5.
 - b) In-Plant Inspector(s), required for re-locatable buildings only SSS-5.
 - c) Contract Information DSA-102.
 - 3) Final Verified Report "Forms" from the Architect and Engineers:
 - a) Architect's Final Verified Report DSA-6A/E.
 - b) Structural Engineer's Final Verified Report DSA-6A/E.
 - c) Mechanical Engineer's Final Verified Report DSA-6A/E.
 - d) Electrical Engineer's Final Verified Report DSA-6A/E.
 - 4) Final Verified Report "Forms" from the Contractor(s) and Inspector(s):
 - a) Project Site Inspector(s) Final Verified Report DSA-6.
 - b) Contractor(s) Final Verified Report DSA-6.
 - c) In-Plant Inspector(s) Final Verified Report DSA-6.

- d) Special Inspector(s) Final Verified Report DSA-6.
- 5) Other Final Verified Reports and Affidavits for:
 - a) Laboratory - To be signed by Licensed Professional Engineer.
 - b) Shop Welding and Fabrication - To be signed by AWS/CWI Welding Inspector
 - c) Field Welding - To be signed by AWS/CWI Welding Inspector
 - d) High Strength Bolt Installation
 - e) Glu-Laminated Fabrication
 - f) Manufactured Trusses
 - g) Masonry Inspection
 - h) Engineered Fill - To be signed by the Geotechnical Engineer
 - i) Bleacher Fabrication
 - j) Other items required by the State Agencies
- 6) Notices, Certificates, and Change Orders
 - a) Notice of Completion - Signed by the Owner, Notarized and recorded with the County Recorders Office.
 - b) Weighmaster Certificate(s)
 - c) Automatic Fire Sprinkler System
 - d) Fire Alarm System Components
 - e) Fire Standpipe System
 - f) Fire Suppression System
 - g) Smoke Ventilation System
 - h) Skylight System
 - i) Bleacher System
 - j) Change Orders - Signed and fully executed.
 - k) Other documents and/or requirements required by the State Agencies
- 7) Field Visit Reports, Correction Reports, Punch Lists & Final Review Reports
 - a) Field Visit Reports from State Agencies
 - b) Field Visit Reports from Architect and Engineers
 - c) Inspector's Correction Reports
 - d) Contractor Punch Lists
 - e) Architect, Engineers and Owner Final Review Reports
 - f) A jointly signed and notarized Affidavit from the Contractor and Project Inspector (formerly the Inspector of Record), indicating that any and all items of correction noted in the above documents have been corrected (including Testing Laboratory Reports).

1.3 QUALITY ASSURANCE:

- A. Safety, Fire and Environmental Protection, and Insurance standards shall be strictly adhered to in all phases of the construction work. It shall be the responsibility of the Contractor to determine the standards applicable to this project as set forth in all codes, regulations, and ordinances having jurisdiction, and as set forth elsewhere in the Specifications.
- B. All specific requirements stipulated in, or required by code references included under all sections of DIVISIONS 02 through 49 inclusive of this specification, and as detailed under Article 3.4 of this Section, shall be required under this Contract.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Materials:
 - 1. Use only those specified materials or types of materials recommended and approved by the manufacturer of the item to be cleaned.
- B. Touch-Up Materials:
 - 1. Use only those materials furnished by or as recommended and approved by the manufacturer of the item to be touched up. Colors and finish characteristics shall exactly match the base material and extra materials, labor, and services required to achieve this result shall be provided by the Contractor(s).
- C. Replacement Materials:
 - 1. Materials that are damaged and not repairable, or materials that are destroyed shall be replaced with equal and identical materials of the same manufacture and shall function in conjunction with the remaining portions of that material. Items no longer manufactured or available shall be replaced with comparable materials as approved by the Architect and at no additional cost to the Owner.
 - 2. Materials that are required for maintenance replacement by the owner after the guarantee period has expired, or by the contractor during the guarantee period shall exactly match those materials installed as to make, style, color lot, etc., under this contract, and shall be delivered to the owner in marked, identified containers.
- D. Extra Materials:
 - 1. Carefully examine the requirements of the applicable Sections of all DIVISIONS and specifically of DIVISION 09 and deliver the materials required to the Owner.

PART 3 - EXECUTION

3.1 REPAIR AND RESTORATION

- A. All damaged items shall be repaired and replaced as directed using proper materials and craftsmen skilled in that particular trade. Materials shall be as follows:
 - 1. All repair or replacement parts shall be of the same equality and manufacturer as the item being repaired.
 - 2. All touch-up paint shall be as provided by the item manufacturer for that purpose and shall exactly match the original color and finish.

3.2 FIELD QUALITY CONTROL

- A. Final Reviews:
 - 1. In addition to all items covered under those Sections of Divisions 02 through 49 inclusive, the Contractor shall comply with the requirements stated herein.

- a. The Contractor shall request in writing a final review (see Contractor's Request for Final Review form at the end of this Specification Section).
 - 1) The Contractor shall allow a forty-eight (48) hour time period of advance notification prior to the requested date and time indicated on the Review Request form.
 - 2) The Contractor represents that the work has been carefully inspected by the Contractor to determine that the work is complete and in compliance with all requirements set forth.
 - b. The Contractor shall prepare and shall submit the initial Contractor's Punch List identifying the items that remain uncompleted forty-eight (48) hours prior to the scheduled final review by the Architect.
 - c. Under no circumstances shall the Contractor ask the Architect or his representative to make these determinations for him.
2. The Architect shall review the initial Contractor's Punch List along with the Owner's Project Inspector, and determine together whether or not the Project is ready for final review. If approved, the Architect or its representative will make the final review on the date and time requested in the Contractor's Request for Final Review form, except under the following conditions:
 - a. Upon reviewing a portion of the Project and finding quantities of work incomplete or not in compliance, the review shall cease, and the Architect will notify the Contractor.
 - b. If the Contractor has assured the Architect of the completeness and/or accuracy of the work, and the review does not bear this contention out.
 3. The above conditions will be adhered to rigidly to prevent the Architect from being required to act as a supervisory agent of the Contractor by being asked to determine the degree of completion,.
 - a. When the Contractor requests additional reviews, he shall reimburse the Architect for all time and expense incurred as indicated on the Contractor's Request for Final Review form at the end of this Specification Section.
 - b. The Architect is herein defined as any of those firms or individuals listed by references on the drawings, including all consultants identified herein.
 - c. All requests for Project Final Review (and re-review) shall be made in writing on the form provided at the end of this Specification Section.
 4. When the Architect does approve of the degree of readiness for the Project based on the initial Contractor's Punch List and the readiness of the Project, the Architect will make his final review, adding to the Contractor's Punch List any other items that require further completion.
 5. The Contractor shall take the initial Contractor's Punch List, together with the Architect's Punch List, and initial and date each item on each list as to when it was completed.
 6. Once both lists are completed and signed by the Project Inspector, the Contractor shall submit to the Architect the completed lists for final review and approval prior to filing for Substantial Completion.

3.3 CLEANING

A. During Construction:

1. Oversee cleaning and ensure that building and grounds are maintained free from accumulations of waste materials and rubbish.
2. Sprinkle dusty debris with water.
3. At reasonable intervals during progress of work, clean up site and access and dispose of waste materials, rubbish, and debris.

4. Provide suitable containers and locate on site for collection of waste materials, rubbish, and debris.
5. Do not allow waste materials, rubbish and debris to accumulate and become an unsightly or hazardous condition.
6. Remove waste materials, rubbish and debris from the site and legally dispose of at public or private dumping areas off the Owner's property.
7. Vacuum clean interior building areas when ready to receive finish painting and continue vacuum cleaning on an as-needed basis until building is ready for acceptance or occupancy.
8. Lower waste materials in a controlled manner with as few handling as possible; do not drop or throw materials from heights.
9. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

B. Final Cleaning:

1. Use experienced professional cleaners for final cleaning.
2. At completion of construction and just prior to acceptance or occupancy, conduct a final review of exposed interior and exterior surfaces.
3. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from interior and exterior surfaces.
4. Repair, patch, and touch-up marred surfaces to match adjacent finishes.
5. Broom clean paved surfaces; rake clean other surfaces of grounds.
6. Replace air conditioning filters if units were operated during construction.
7. Clean ducts, blowers, and coils if air conditioning units were operated during construction.
8. Maintain cleaning until the building, or portion thereof, is accepted by the Owner.

3.4 DEMONSTRATION

- A. During Construction and as each piece of equipment is installed, provide the following tests:
1. Verify that all external service connections have been properly completed, and that piping and/or wiring is properly sized, and contain all necessary safety devices.
 2. Verify that the equipment is free of shipping materials, tie downs, or other internal obstructions.
 3. Conduct tests employing the manufacturer's operating instructions as a sequential guide.
 4. Verify that all portions of the equipment function properly and that the total performance criteria is satisfied.
 5. Make adjustments, replacements, or repairs necessary to achieve full operational capability and repeat tests until performance is achieved and approval obtained.
- B. Prior to acceptance, verify that all conditions specified in the Article titled FIELD QUALITY CONTROL, Final Review, have been satisfied and that equipment is ready for continuous use. Provide the following services preparatory to acceptance:
1. Clean or replace all filters and/or strainers.
 2. Adjust all belts and drive mechanisms.
 3. Lubricate all moving parts as required by manufacturer's operating instructions.
 4. Demonstrate to the Owner's representative and the Architect or Engineer the method and sequence of operation, and provide testing devices and/or data to verify that performance equals that specified.
 5. Provide operating instructions in bound form along with manufacturer's parts list and written warranties.

3.5 SCHEDULES

- A. See next page for Request for Final Review from the Contractor(s):

(The rest of this page is left intentionally blank)

**CONTRACTOR'S REQUEST
FOR
FINAL REVIEW FORM**

PROJECT: _____
(Name of Project and DA Project Number)

TO: **DARDEN ARCHITECTS, INC.**
6790 N. West Avenue
FRESNO, CA 93711

FROM: _____
(Contractor)

(Address)

WE HEREBY request Final Review on _____ and _____.
(Date) (Time)

WE HEREBY, request and certify:

1. The project is ready for Final Review.
2. The undersigned will compensate the Architect at a rate of \$176.00 an hour for further review, investigation and comments if it is determined that the Project is not ready for final review as indicated earlier within this Specification Section. The Architect is herein defined as any of those firms or individuals listed by reference on the Drawings, including all Consultants identified herein.

Submitted By (Contractor)

Signature _____
Firm _____
Address _____
Date _____
Telephone _____

Below is

for Use by Design Consultant only

___ Conditions for Final Review Accepted
___ Final Review Accepted as Noted
___ Final Review Not Accepted

By _____

Date _____

Remarks _____

END OF SECTION

SECTION 017836 – WARRANTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. In addition to providing all other warranties specified in the Project Manual and without affecting any rights of Owner under State or Federal law, Contractor shall warrant that the Work done under this Project Manual will be free from faulty materials or workmanship and hereby agrees, upon receiving notification from the Owner or his Agent, to immediately remedy, repair or replace, without cost to the Owners and to his entire satisfaction, all defects, damages or imperfections appearing in said work within a period of 18 months unless specified otherwise, after date of final acceptance by the Owner of all work done under this Project Manual, regardless of whether or not the Owner or persons operating under contract with the Owner partially or wholly occupies any portion of the work prior to acceptance. For work performed after completion, the 18 month period shall be extended by the period of time between the date of final acceptance by Owner and actual performance of the work. This obligation shall survive acceptance of the work and termination of the Contract.
1. Warranties shall be in the form outlined below and shall be submitted in duplicate to the Contractor and submitted on his own letterhead.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

- A. Warranty Form: *(following page.)*

(Contractor's Letterhead)

Project Number: _____

Project Name: _____

WARRANTY FOR

We hereby warrant and the General Contractor warranties that

has been done in accordance with the Drawings and the Specifications and that the Work as installed will fulfill the requirements of the warranty included in the Project Manual. We agree to repair, replace any or all of our work together with any other adjacent work which may be displaced or damaged by so doing that may prove to be defective in its workmanship or materials within a period of _____ years from date of acceptance of the above-named without any expense to the Owner, ordinary wear and tear and unusual abuse or neglect excepted. In the event of our failure to comply with above-mentioned conditions within ten (10) days after being notified in writing by the Owner or his agent, we collectively or separately, do hereby authorize the Owner to proceed to have said defects repaired and made good at our expense and we will honor and pay the costs and charges therefor upon demand.

(Signature of Subcontractor)

(Signature of Contractor)

Date: _____

- B. Submit 2 copies of all manufacturer's or installer/applicator's warranties and bonds as specified within Division 02 –49.
- C. Submit to Architect together with Project Record Documents.
- D. Accompany submittals with transmittal letter in duplicate.
- E. When Product Submittals are required, submit copy of warranty with product submittal.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 017839 – PROJECT DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Project As-Built Drawings in Digital PDF Format.
 - 2. Project Record Drawings in Digital PDF Format.
 - 3. Record Specifications in Digital PDF Format.
 - 4. Record Product Data in Digital PDF Format.
- B. Related Requirements: The following Project Manual Sections contain requirements that relate to this Section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.3 DEFINITIONS

- A. **CONTRACT DOCUMENTS:** Contract Documents include Contract Forms, Project Manual (Contract Requirements and Specifications), Drawings, Addenda, Change Orders and Modification Documents (Supplemental Instructions, Request for Information, Construction Change Directives).
- B. **PROJECT "AS-BUILT" DOCUMENTS:** A set of Contract Documents used during construction for recording of actual construction information during construction. The recording of construction information shall be maintained on the Contract Drawings and in the Project Manual.
- C. **PROJECT "RECORD" DOCUMENTS:** A set of Contract Documents used at the completion of construction for transferring and documenting the actual construction information recorded on the PROJECT "AS-BUILT" DOCUMENTS.
- D. **RECORD PRODUCT DATA:** A set of Submittals and Shop Drawings that have documentation of field changes made after review.

- E. AGENCY DOCUMENTATION: Documents required by the Agency Having Jurisdiction to be prepared and submitted by the contractor.

1.4 SUBMITTALS:

- A. Submit the following in accordance with specification Section SUBMITTAL PROCEDURES.
- B. Format for Submittals:
 - 1. Accompany each submittal with a SHOP DRAWING AND SUBMITTAL TRANSMITTAL:
 - 2. PDF electronic file names shall match the Sheet Numbers of the Contract Documents.
 - 3. Provide labels on DVD's and DVD Cases and include the following:
 - 4. First Line: CLOSE-OUT DOCUMENTS
 - 5. If submittal contains multiple disks append to first line Disk, i.e. (1 of 2)
 - 6. Second Line: Project Name and Year
 - 7. Third Line: Architect Firm Name and Architect's Project Number
 - 8. Fourth Line: DSA or HCAI Number (if applicable)
 - 9. Fifth Line: Contractor Company Name
 - 10. PDF files for Project "Record" Documents and Record Product Data shall be combined with PROJECT CLOSEOUT, Maintenance Data and Operations Data, and WARRANTIES on a single set of DVD's.
- C. PROJECT "AS-BUILT" DOCUMENTS: Comply with the following:
 - 1. Number of Copies: Submit one PDF-copy set of marked-up as-built drawings and one PDF-copy of marked-up as-built specifications.
 - 2. Clearly Label each copy "PROJECT 'AS BUILT' DOCUMENTS" in two-inch-high printed letters.
- D. PROJECT "RECORD" DOCUMENTS: Comply with the following:
 - 1. Number of copies: Submit copies of the Record Documents as follows:
 - a. Initial Submittal:
 - 1) Submit one PDF-copy of marked-up record drawings and one PDF copy of marked-up record specifications,
 - 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - 2. Final Submittal:
 - 3. Submit one PDF-copy of marked-up record drawings, one PDF copy of marked-up record specifications.
 - 4. Each record drawing sheet shall be labeled, "PROJECT "RECORD" DOCUMENT."
 - 5. Print each drawing, whether or not changes and additional information were recorded.
 - 6. Clearly Label each copy "PROJECT "RECORD" DOCUMENTS in two-inch-high printed letters in a prominent location.
- E. RECORD PRODUCT DATA: Comply with the following:
 - 1. Number of Copies:
 - a. Submit one PDF-copy set of marked-up shop drawings.
 - b. Submit three DVD's of PDF electronic files of scanned marked-up shop drawings.
- F. AGENCY DOCUMENTATION: Comply with the following:

1. Submit Documentation Required by the Agency Having Jurisdiction utilizing the format and system established by the Agency.

1.5 SYSTEM DESCRIPTION

- A. The Architect considers the Project Record Documents to be of significant importance to the Owner.
- B. Project Record Documents provide important information for the Owner's records, they form an invaluable record for future reference for concealed conditions, facilities management processes, and future additions and renovations.

PART 2 - PRODUCTS

2.1 General:

- A. All costs (including the time) required for recording, transferring, and copying all documentation shall be part of the Contractor's Overhead Expense.
- B. Provide red pencil or ink (contrasting color) for all marking of the PROJECT "AS-BUILT DOCUMENTS, PROJECT "RECORD" DOCUMENTS, and RECORD PROJECT DATA.
- C. Do not permanently conceal any work until required information has been recorded.

2.2 RECORD DRAWINGS

- A. PROJECT "AS-BUILT" DOCUMENTS: Maintain one set of marked-up PDF copies of the Contract Drawings: and Specifications, incorporating new and revised drawings as modifications are issued.
 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 provide information for preparation of corresponding 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 acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Elevation for finish grade for all points indicated on Site Grading Plan.
 - b. Depths of various elements of foundation in relation to first floor finish elevation.
 - c. Horizontal and vertical location of underground utilities and appurtenances referenced to visible and accessible features of structure.
 - d. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.

- h. Duct size and routing.
 - i. Locations of concealed internal utilities Field changes of dimensions and details.
 - j. Changes made by Addenda, Change Orders and other Modification Documents.
 - k. Details not on original Contract Documents.
 - l. Changes made on Shop Drawings.
3. Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
- a. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - b. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - c. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 - d. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 - e. Note related Changes Orders, record Product Data, and record Drawings where applicable.
4. Mark the Contract Drawings and Specifications completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
5. Note Request for Information numbers, Supplemental Instruction numbers, Construction Change Directive numbers, Change Order numbers, and similar identification, where applicable.

2.3 PROJECT "RECORD" DOCUMENTS:

- A. General: Transfer all changes, notations, etc. from the "AS-BUILT" PROJECT DOCUMENTS to the "PROJECT RECORD" DOCUMENTS in the same quality as the original Contract Documents.

2.4 RECORD PRODUCT DATA

- A. Maintain one set of marked-up PDF copies of the Shop Drawings and Product Data, incorporating any modifications to the reviewed documents.
- B. Preparation: Mark Product Data to indicate the actual product installation where installation varies from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders and record Drawings where applicable.
 - 4. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.5 AGENCY DOCUMENTATION

- A. Contractor shall prepare and upload all applicable forms pertaining to the Contractor as required by the Division of State Architect DSA Procedure 13-02, including but not limited to:
1. DSA 6-C - Contractor Verified Report.
 2. NFPA System Record of Completion.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE:

- A. Recording:
1. Keep all documents current, PROJECT "AS-BUILT" DOCUMENTS shall be kept current at all times. Post changes and revisions to project as-built documents as they occur; do not wait until end of Project.
 2. The Project Inspector will review the PROJECT "AS-BUILT" DOCUMENTS periodically for the Architect at the time Payment Requests are processed. Should the PROJECT "AS-BUILT DOCUMENTS not be current and up to date, the Owner reserves the right to hold the Payment Request until compliance with the Contract Documents has occurred.
- B. Maintenance of Documents:
1. Maintain at job site the following:
 - a. Contract Drawings.
 - b. Project Manual/Specifications.
 - c. Addenda.
 - d. Reviewed shop drawings.
 - e. Change Orders.
 - f. All Modification Documents.
 - g. Field test records.
 2. Store documents in field office apart from documents used for construction.
 3. Provide files and racks for storage of documents.
 4. File documents in accordance with Project Filing Format or Uniform Construction Index.
 5. Maintain documents in clean, dry, legible condition.
 6. Do not use record documents for construction purposes.
 7. Make documents available at all times for inspection by Architect, Owner and Owner's Inspector.

END OF SECTION

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SECTION 020110 – EXISTING LANDSCAPE MAINTENANCE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

- A. Protection: Provide all barricades as required to prevent all damage to existing plant materials to remain including, but not limited to, protection from mechanical damage, soil compaction, pollution from all sources, and description of environmental support which would result in the loss of vigor of said plantings.
- B. Drip Line: An imaginary line on the ground around a tree representing its outermost branch tips. All of the area within the drip line of existing trees to remain is to be protected from damage as specified herein, unless otherwise noted.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
- B. Provide four (4) copies of the following:
 - 1. Shop Drawings:
 - a. Construction details for protective barriers and barricades are required.
 - 2. Schedule:
 - a. Watering schedule, where interruption of irrigation systems will exceed one watering period.
 - 3. Record of Existing Conditions:
 - a. Video record all existing planting at the project site designated to remain. Recording shall show all aspects of existing planting to remain throughout the project site.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Storage:

1. Do not store materials or equipment under the branches of all existing trees or in turf or ground cover areas to remain.

1.5 PROJECT CONDITIONS

A. Review:

1. Visit and walk the site with Owner's representative to clarify Scope of Work and understand project conditions.

B. Documentation:

1. Confirm location of all plant materials to remain. Examine existing irrigation system to remain and report all malfunctioning equipment to be repaired by Owner. Record all discrepancies and all conditions which threaten existing plantings.

C. Acceptance:

1. Commencing work shall be taken as acceptance by the Contractor of responsibility for the protection of all existing site plantings with the exception if discrepancies and corrections noted above.

D. Replacements:

1. General:
 - a. Existing planting to remain which exhibits conditions which are determined as unacceptable due to inadequate protection during construction shall be replaced by Contractor at no expense to Owner.
2. Planting:
 - a. Closely match replacements to adjacent specimens of the same species, variety, and cultivate. Replacements are to be the same size as adjacent material at the time of replacement.

E. Traffic:

1. Do not operate or park equipment within the drip line of existing trees to remain. Keep foot traffic out of existing ground cover and turf areas. Protect shrub areas from cross traffic.

F. Operations:

1. Do not permit burning, temporary, or permanent dumping or storage of construction debris within drip line of existing trees to remain. Give written notification if any construction activity by any Contractor threatens to damage existing plants to remain.

1.6 SCHEDULING

- A. Construct protective barriers prior to demolition and selective clearing. Construct other barriers as indicated in the Part 1 Article titled - SUMMARY.

- B. A demolition meeting will be called prior to demolition where the Project Inspector, owner and Architect will set the extent of the protective barriers.

1.7 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's General Warranty:
 - 1. During the Warranty Period for new planting, similarly warrant all existing plant materials against decline resulting from damage during construction.
 - a. Warranty Period: One Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period One (1) Year.

1.8 MAINTENANCE

- A. Existing Planting:
 - 1. General:
 - a. During the Maintenance Period for new planting, similarly maintain all existing plantings to remain.
 - 2. Fertilizers:
 - a. Do not use complete fertilizers on existing plant materials unless oils test indicates specific nutrient deficiencies.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Fertilizers, herbicides, and Pest Control at Contractor's option as required to maintain existing landscaping.
- B. Barriers And Barricades:
 - 1. Contractor's option.
- C. Safety Materials:
 - 1. Provide all reflective signage and/or flashers as required by all codes and ordinances affecting barricaded plantings to remain.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide barriers at the drip line of all trees designated to remain. Grouping of trees maybe enclosed by a single protective fence. Similarly protect turf, groundcover, and shrub areas form construction activities

3.2 FIELD QUALITY CONTROL

- A. Cut: Do not permit machine excavation within the drip line of existing trees to remain. All such work shall be by hand labor. Do not permit more than two (2) inches of existing soil to be removed within the drip line except as authorized in writing by Architect.
- B. Fill: Do not permit stockpiling of soil within the drip line of all existing trees nor on existing turf or ground cover areas. Do not permit more than three (3) inches of fill to be placed within the drip line during grading operations without written acceptance by Architect.
- C. Storage: Do not store materials or equipment under branches of all existing trees nor in turf or ground cover areas to remain.

3.3 IRRIGATION

- A. One week prior to the start of construction the contractor shall install and maintain for the project duration a controlled water system to maintain consistent and even watering to all plants to remain. System shall be type appropriate for the plants to remain and configured to give the appropriate amount of water for each type of plant.
- B. If the irrigation system is disrupted for any reason during construction the contractor shall restore irrigation within twenty four (24) hours of the disrupted service.

3.4 REPAIR OF DAMAGED PLANT MATERIAL

- A. During the course of construction, if roots two inches (2•) or larger in diameter are cut, the contractor shall take the following immediate action to minimize further damage to the plant material.
- B. Stop construction activity, inform the Project Inspector and Architect. Contact a qualified arborist for inspection of plant material and report of construction impact on plants. The expense for the Arborist's services shall be the contractor's responsibility.
- C. If the arborist determines that damage occurred the contractor will be directed within forty eight (48) hours to perform the following:
 - 1. Prune plant material to I.S.A. standard specifications to compensate for root loss.
 - 2. Aerate soil to relieve compaction and to improve air and water exchange to root system.

3. Fertilize trees with deep water bore at a rate of one pound of actual nitrogen per 1,000 sq. ft.
4. Inject plant hormones (growth stimulator) through irrigation system.

- D. This process shall be implemented within forty eight (48) hours of direction by the arborist.
- E. Failure to perform repairs within specified time will institute liquidated damages to the contractor of two hundred (200) dollars for each calendar day by which the completion of the repairs is delayed.
- F. The owner reserves the right to hire a person or persons to perform the repair work in the event the contractor does not respond in a timely manner. The expense for this work will be the contractors responsibility at no further expense to the Owner.

3.5 CLEANING

- A. At close of construction in each area, remove all protective barriers at the direction of the Architect. Transport all barrier materials off site at no additional expense to Owner.
- B. Repair all grades and restore all damaged plant materials.

3.6 PROTECTION

- A. Provide all reflective signage and/or flashers as required by all codes and ordinances affecting barricaded plantings to remain.
- B. Barriers and Barricades:
 1. Provide as required to meet all regulatory requirements and protection of landscaping during construction.
 2. Remove when Owner occupies the Project.

END OF SECTION

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SECTION 02 4119-SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected site elements.
 - 2. Salvage of existing items to be reused or recycled.
- B. Related Requirements:
 - 1. Section 01 1000 "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
 - 2. Section 01 7300 "Execution" for cutting and patching procedures.
 - 3. Section 31 1000 "Site Clearing" for site clearing and removal of above- and below-grade improvements.

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.4 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.5 FIELD CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- D. Storage or sale of removed items or materials on-site is not permitted.
- E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
 - 1. Comply with requirements specified in Section 01 3233 "Photographic Documentation."
 - 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.

3.2 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain adequate ventilation when using cutting torches.
 - 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 - 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 9. Dispose of demolished items and materials promptly. Comply with requirements in Section 01 5000 "Temporary Facilities and Controls."
- B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.

- C.
- D. Removed and Salvaged Items:
 - 1. Transport items to Owner's storage area.
- E. Removed and Reinstalled Items:
 - 1. Clean and repair items to functional condition adequate for intended reuse.
 - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - 3. Protect items from damage during transport and storage.
 - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- F. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.3 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 4. Comply with requirements specified in Section 01 5000 "Temporary Facilities & Controls."
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.4 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 02 4119

SECTION 031101 – CONCRETE FORMWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all Concrete Formwork materials, and other related items necessary to complete the Project as indicated by the Contract Documents.

- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 15 14 DRILLED ANCHORS
 - 4. 03 20 00 REINFORCEMENT
 - 5. 03 30 00 CAST-IN-PLACE CONCRETE
 - 6. 03 35 00 POLISHED CONCRETE FINISHING
 - 7. 04 22 00 CONCRETE MASONRY UNITS
 - 8. 05 12 00 STEEL AND FABRICATIONS
 - 9. 06 10 00 ROUGH CARPENTRY
 - 10. 06 41 23 MODULAR CASEWORK
 - 11. 07 92 00 SEALANTS
 - 12. 09 22 16 METAL FRAMING
 - 13. 31 00 00 OFFSITE DEVELOPMENT
 - 14. 31 20 00 EARTHWORK
 - 15. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 16. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. Standards:
 - 1. In accordance with the latest edition of the following standards:
 - a. ACI American Concrete Institute
 - b. APA The Engineered Wood Association (formerly the American Plywood Association)
 - c. PS Product Standards of the U.S. Department of Commerce, latest edition
 - d. WCLIB West Coast Lumber Inspection Bureau

1.3 DEFINITIONS

- A. Terms used throughout this section.
 - 1. Unexposed:
 - a. "Unexposed to View" for determining what forms to use for an unfinished concrete surface.

2. Exposed:
 - a. "Exposed to View" for determining what forms to use for a finished concrete surface.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 1. Product Data.
 - a. Forming materials.
 - b. Tie rods and spreaders.
 - c. Formwork for exposed concrete.
 - d. Form coatings and release agents.
 2. Shop Drawings:
 - a. The Contractor shall submit drawings showing the proposed form tie locations for exposed form indentations.
 3. Samples.
 - a. Form liners for specific finished concrete surfaces.
 4. Quality Assurance/Control Submittals:
 - a. Manufacturer's written Instructions:
 - 1) Instructions for specific form liner manufacturer indicated.
 5. Closeout Submittals:
 - a. Record Documents in accordance with Specification Section – PROJECT DOCUMENTS.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 2. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the Work.
- B. Regulatory Requirements:
 1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
- C. Mockups:
 1. Cast in accordance with Specification Section – CAST-IN-PLACE CONCRETE, Part 1 Article titled "SUBMITTALS", paragraph titled "Mockups" for requirements.
 - a. Provide with all applicable joints, grooves, textures, etc.

1.6 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period: One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section - WARRANTIES.
 - a. Warranty Period: One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified product manufacturer:
 - a. MDO Plywood: SIMPSON TIMBER PRODUCTS.
 - b. HDO Plywood: SIMPSON TIMBER PRODUCTS.
 - c. Steel Forms: EFCO CORP.
 - d. Textured Form Liners:
 - 1) CENTRIA.
 - 2) GREENSTREAK PLASTIC PRODUCTS COMPANY.
 - 2. Specified product accessories:
 - a. Chamfer Strips: MEADOW / BURKE COMPANY.
 - b. Cement Compound Plugs: MEADOW / BURKE COMPANY.
 - c. Double Sided Foam Tape: 3M COMPANY.
 - d. Rustication Strips: MEADOW / BURKE COMPANY.
 - e. Spreaders and Ties: MEADOW / BURKE COMPANY.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Unexposed finish forms:
 - 1. Provide plywood, lumber, or another acceptable material.

- a. Lumber shall be dressed on at least two edges and one side for tight fit, complying with WCLIB Standard Grading and Dressing Rules #17, for Douglas Fir Form Lumber.
 - b. When plywood is used, provide panels complying with PS1, B-B (Concrete Form) Plywood, Group 1, EXT-APA mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Exposed finish forms:
1. Provide plywood panel type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practical sizes to minimize number of joints and to conform to joint system shown on the drawings.
 - a. Single Pour Forms: Provide liner panels that are complying with PS1, MDO Plywood, B-B, Group 1, EXT-APA, mill-oiled, edge-sealed, with each piece bearing legible inspection trademark, which are limited to "single-pour use" forms, that are manufactured by SIMPSON TIMBER PRODUCTS, or approved equivalent.
 - b. Multiple Pour Forms: Provide HDO Plywood "Multipour" liner panels, which are limited to "double-pour use" forms, that are manufactured by SIMPSON TIMBER PRODUCTS, or approved equivalent.
- C. Exposed finish forms at Curved Sectional Seat Walls
1. Provide Steel form
 - a. HAND-E-FORM panels with citrus degreaser and EFCO Form Releaser per manufacturer recommendation.

2.3 ACCESSORIES

- A. Cement Compound Plugs:
1. Provide gray colored cement compound plugs ("SnaPlug" by MEADOW / BURKE, or approved equivalent) in highly visible concrete surface areas.
 - a. Provide "flush type" in cone holes of size appropriate to the hole size created by tie-holes.
 2. Provide a waterproof neoprene adhesive ("SnaPlug Bonder" by MEADOW / BURKE, or approved equivalent), resistant to weather aging and bacterial growth, for adhering cement compound plugs into cone holes.
- B. Chamfer Strips:
1. Provide wood chamfer strips free of knots, for forming edges of cast-in-place concrete.
- C. Double Sided Foam Tape: Provide "Scotch" double sided, high density, pressure sensitive adhesive, foam tape as manufactured by The Tape Division of 3M PRODUCTS, INC., or approved equivalent.
- D. Form release agent:
1. Provide commercial formulation form release agent with a maximum volatile organic compounds (VOC's) in compliance with the CARB in the area where the project is located, that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 2. Provide form liner manufacturer's form release agent when a particular form liner is used to maintain compatibility with form release agent and the form liners used for this project.

- E. Spreaders and ties for loose plywood forming:
 - 1. Spreader Ties: Use metal spreaders and ties for surfaces to be sacked. Use type that will give positive tying and accurate spreading for accurate sizing of cast walls or forms. Snap type shall leave no metal closer than 1-1/2 inches from exposed surface of concrete and have spreader cones no larger than 1 inch diameter.
- F. Nailer Strip:
 - 1. Provide decay resistant pressure treated wood nailer strips of sizes and locations indicated on the drawings.
 - 2. All pressure treated wood (decay or fire-retardant) shall be in accordance with the applicable standards of the AWWPA as referenced in the Specification Section - ROUGH CARPENTRY.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface preparation:
 - 1. Consult with other Trades relative to required openings, and items to be embedded in concrete (i.e., piping, conduit, hangers, reglets, anchors, inserts, sleeves, etc.). Coordinate work specified under other sections to ensure proper, adequate interfacing between trades, for openings, chases, blockouts, and other required interfacing items.

3.2 ERECTION

- A. All formwork shall be:
 - 1. Designed and constructed in accordance with ACI Standard 347 "Recommended Practice for Concrete Formwork".
 - a. Follow ACI 303R "Guide to Cast-In-Place Architectural Concrete" for further recommendations in design and use of Patterned Form Liners.
 - 2. Construct to size, shape, alignment, elevation and position of all concrete elements.
 - a. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features required in the work. Use selected materials to obtain required finishes.
 - 3. Properly separate and securely tie with Spreaders and Ties to maintain proper shape. Wood spreaders shall not be allowed to remain in concrete work.
 - a. Use "Penta-Ties" where indicated on the drawings. Glue in cement compound plugs.
 - 4. Brace, support and center sufficiently to carry without excessive deflection all live and dead loads imposed during construction and placement of concrete, and to insure safety to workers and passersby.
 - a. Block adjoining permanent pan units left in place to prevent lateral deflection of forms while placing concrete.
 - 5. Properly construct to eliminate all open joints or discontinuous surfaces.
 - a. Solidly butt joints with double sided foam tape, apply silicone sealant at concrete face, and provide backup at joints to prevent cement paste or mortar from leaking.

- B. All joints shall be:

1. Uniform and backed by 2 inch material.
2. Continuous and level or plumb.
3. Sufficiently tight (with double sided foam tape and silicone sealant) to prevent leakage of cement paste.
 - a. Locate joints of formwork whenever possible at rustication joints.
4. Subject to Architect's approval.

3.3 INSTALLATION

- A. General: Design, engineer, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position.
1. Access Openings: Shall be provided in forms for cleaning and inspection of forms and reinforcement.
 - a. In Wall Forms: Provide openings for each pour, composed of a form section held out until inside of each formed cavity has been cleaned, so that no "access hole" is visible in the finished concrete surface.
 2. Architectural Concrete elements shall be formed with MDO (or HDO) form plywood where face uniformity is required such as on signs, plaques, and landscape elements.
 3. Side forms at unexposed footings may be omitted if excavation stands without caving.
 - a. Make footing trench two (2) inches wider than width of concrete footing indicated on the drawings, when earth is used as a form.
 - b. Cut trenches true and straight.
 - c. Make side cuts neat and plumb.
 - d. Bottom of trenches shall be level with reasonably sharp corners.
 4. Formwork above grade (curbs, exposed faces of concrete foundations, etc.) shall be:
 - a. Plywood type as specified treated with Sealer.
 - b. Constructed with plumb and level joints.
 - c. Separated with removable or snap type Spreaders and Ties. Do not use wire ties.
 5. Unintentional indentations in the surface of the concrete left after removal of spreaders and ties shall be filled and sanded unless the architect's approval is given to do otherwise.
 - a. Install Cement Compound Plugs where exposed form tie indentations occur.
 6. Sleeves, anchors and bolts, angles, supports, ties and other materials in connection with concrete construction shall be secured in position before the concrete is placed.

3.4 CONSTRUCTION

- A. Special Techniques – Form Removal and Reuse of Forms:
1. All forms shall be completely removed.
 2. Time of Removal shall be in accordance with ACI 301 "Specifications for Structural Concrete", which requires concrete to reach its specified compressive strength. Variations to the time of removal are listed below subject to the concrete reaching its specified compressive strength:
 - a. Dependent on weather conditions.
 - 1) Due to excessive cold weather for a long duration of days, and subject to the Architect's approval, the time for removal may be extended if deemed necessary.
 - b. Dependent on cylinder test results.

- c. Dependent on recommendations of additive manufacturer when additives are admitted to the mix.
 - d. Typically (verify with three statements above before initiating the following):
 - 1) Foundation Side Forms: Five (5) days after concrete is poured.
 - 2) Wall Forms: Ten (10) day after concrete is poured.
 - 3) Slab Forms:
 - a) Twenty-One (21) days after concrete is poured.
 - b) Re-shore as required to support dead loads and any construction loads applied.
 - e. Remove forms in a manner that will not harm concrete. Do not hammer or pry against concrete.
3. Nails, tie wires and form ties shall be cut off flush with face of concrete.
 4. Snap type spreaders to be snapped off inside the wall surface.
 5. Clean and repair surfaces of forms to be reused in the work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release compound as specified for new formwork.
 6. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to the Architect.

B. Site Tolerances:

1. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 "Guide to Formwork for Concrete" limits:
 - a. Provide Class A tolerances (permitted irregularities are 1/8" in 10' for both gradual and abrupt) for all concrete surfaces exposed to view, or surfaces that will receive additional applied finishes.
2. Concrete work out of alignment, or level or plumb exceeding the allowable tolerance will be cause for rejection of the whole work affected. Such work shall be removed and replaced as directed by Architect with no additional cost to Owner.

3.5 CLEANING

- A. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Re tighten forms and bracing before placing concrete, as required, to prevent leakage of cement paste and maintain alignment.
- B. Remove all wood used for formwork from trenches. No wood shall be left buried in the earth.
- C. Final cleaning shall be in accordance with Specification Section – PROJECT CLOSEOUT.

END OF SECTION

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SECTION 031514 – DRILLED ANCHORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all Drilled Anchor materials, labor, equipment and services necessary for Expansion, Adhesive, and Screw Anchors in Concrete, and Concrete Masonry Units, and related items necessary to complete the Project as indicated by the Contract Documents unless otherwise specifically excluded.

- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 11 01 CONCRETE FORMWORK
 - 4. 03 20 00 REINFORCEMENT
 - 5. 03 30 00 CAST-IN-PLACE CONCRETE
 - 6. 04 22 00 CONCRETE MASONRY UNITS
 - 7. 05 12 00 STEEL AND FABRICATIONS
 - 8. 05 30 00 METAL DECK
 - 9. 06 10 00 ROUGH CARPENTRY
 - 10. 06 41 23 MODULAR CASEWORK
 - 11. 09 22 16 METAL FRAMING
 - 12. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 13. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 - 1. Product Data.
 - a. Submit manufacturer's product data for all expansion and adhesive anchors to be used in this project.
 - 1) Submit current ICC Evaluation Services research or evaluation reports evidencing maximum allowable shear and withdrawal load data.
 - 2. Quality Assurance / Control Submittals:
 - a. Test Reports: Submit to DSA, copy to Project Inspector and Contractor.
 - 1) Tension Testing as required.

1.3 QUALITY ASSURANCE

- A. Single Source Responsibility:
 - 1. To ensure consistent quality of anchorage, obtain drilled anchors from a single manufacturer.

2. To ensure consistency of anchorage, obtain adhesive for anchorage from a single manufacturer.
- B. **Manufacturer Qualifications:** Provide drilled and adhesive anchors from a manufacturer that can demonstrate ICC approvals that are current and acceptable to review by the DSA/SSS.
- C. In accordance with Specification Section - REGULATORY REQUIREMENTS and the following:
 1. ICC International Code Council.
 2. IR Interpretation of Regulations.
- D. **Job Testing:** For verifying satisfactory installation workmanship, an independent laboratory will perform proof load tests of drilled anchors acting in tension or shear in the presence of the Project Inspector.
 1. When drilled-in expansion-type anchors or other post-installed anchors acceptable to the enforcement agency are used in lieu of cast-in-place bolts, the allowable shear and tension values and installation verification test loads shall be acceptable to the enforcement agency.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in original, unopened packages with manufacturer's labels identifying products legible and intact.
- B. Store materials inside, under cover and in a manner to keep them dry, protected from the weather, surface contamination, corrosion, damage from construction traffic and other causes.

1.5 WARRANTY

- A. **Contractor's General Warranty:**
 1. In accordance with Specification Section - WARRANTIES.
- B. **Manufacturer's Warranty:**
 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period: One (1) Year.
- C. **Installer's Warranty:**
 1. In accordance with the terms of the Specification Section - WARRANTIES.
 - a. Warranty Period: One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified Product Manufacturer:
 - a. Expansion Anchors:
 - 1) HILTI INC.
 - 2) Acceptable Alternative Manufacturers:
 - a) DEWALT.
 - b) SIMPSON.
 - b. Adhesive Anchors:
 - 1) HILTI INC.
 - 2) Acceptable Alternative Manufacturers:
 - a) DEWALT.
 - b) SIMPSON.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Provide manufacturers standard drilled anchors (expansion or adhesive) for installation into Concrete or Concrete Masonry Units unless noted otherwise.
1. Metal Finishes (corrosion resistant):
 - a. Stainless Steel.
- B. Expansion Anchors:
1. Wedge Anchors: The WEDGE category features a small split expansion ring installed on a tapered (integral cone) part of the stud at the bottom. As the nut is tightened, withdrawing the stud portion from the hole, the expansion ring engages the concrete and is further expanded on the tapered part of the stud.
 2. Sleeve Anchors: The SLEEVE category is similar to the wedge except a large expansion sleeve is used instead of a small expansion ring. The outside of the sleeve defines the anchor diameter with the threaded stud being of a smaller diameter since it fits inside the sleeve. The stud has an integral cone expander at the bottom similar to the wedge category. The expansion mechanism is similar to the wedge category except the top of the sleeve is normally in contact with the nut/washer and is initially forced down over the cone expander as the anchor is tightened. As the sleeve is expanded, it engages the concrete and continues to expand as the wedge anchor.

3. Shell Anchors: The SHELL category has the most variations, but all use a tapered cone expander, either internal or external, to expand the shell of the anchor against the hole. The anchor is either hammered down over an external expander or a special tool is used to drive an internal expander further into the anchor.
- C. Adhesive Anchors which chemically bonds Steel Rods or Deformed Steel Reinforcement Dowels to concrete or masonry elements:
1. Threaded Steel Rods with minimum yield strength of 36 ksi and complying with ASTM A36 "Specification for Carbon Structural Steel," or ASTM A193 "Specification for Alloy-Steel and Stainless Steel Building Materials for High Temperature or High Pressure Service and Other Special Purpose Applications," Grade B7.
 2. Deformed Steel Reinforcement Dowels shall be a minimum of Grade 60 and comply with ASTM A615 "Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement" or ASTM A706 "Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement".
 3. Adhesives, consisting of two primary components that are stored separately, and having a mixing nozzle provided by the manufacturer combining the components prior to placing in the holes.
 4. Long term durability and stability of the adhesive anchor material and its resistance to loss of strength and chemical change at elevated temperatures shall be established to the satisfaction of the enforcement agency.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordination:
1. Coordinate and provide anchors and installation instructions from the manufacturer for items to be embedded in Concrete or Concrete Masonry Unit construction. Manufacturer's written installation instructions shall be available on the project site.

3.2 INSTALLATION

- A. Fastening to In-Place Construction: Provide anchorage devices where necessary for securing designated items indicated on the drawings, or as necessary for a complete and proper job to in-place construction.
1. Install the anchors in accordance with the requirements given in the ICC Evaluations Services Report recommendations for the specific anchor used.
 2. When installing expansion anchors through metal deck into concrete, the anchors should be installed in the center of the low flute of the decking where practicable in minimum 20 gage deck.
 - a. The minimum depth of embedment shall be 1-1/2 inches above the top flute of the decking (except 1/4 and 5/16-inch diameter anchors for ceilings) when the slab thickness above the top of the flute is at least 3 inches.
 - b. Shell type anchors shall not be used on the underside of concrete and metal deck construction due to damage caused to the concrete when hammering in the shell anchors.

3. Install Adhesive Anchors by placing adhesive into specially prepared holes, then insert rods or dowels into holes in a manner that disperses the adhesive to assure maximum contact between adhesive, surface of the holes and surface of the anchor.
 - a. Adhesive anchors shall not be used in overhead applications.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling and fitting required for designated items of construction. Set work accurately in location, alignment and elevation, level true and free of rack, measured from established lines and levels.
 1. The minimum edge distance and spacing of wedge and adhesive anchors shall not be less than ten (10) diameters or as required by ICC Evaluation Service Report unless specifically shown on drawings.
- C. Use care and caution to avoid cutting or damaging reinforcing bars in Reinforced Concrete or Concrete Masonry Construction.
- D. Do not install expansion or adhesive anchors in recently placed concrete which has not had a minimum 28 day curing period and which has not been accepted as having a minimum compressive strength of 3000 psi.

3.3 FIELD QUALITY CONTROL

- A. Testing, General:
 1. Perform testing in accordance with ACI 318 "Building code Requirements for Structural Concrete and Commentary," and herein specified.
 - a. When expansion or adhesive anchors are listed for sill plate bolting applications, 10 percent of the anchors shall be tension tested.
 - b. When expansion or adhesive anchors are used for other structural applications, all such anchors shall be tension tested.
 - 1) Expansion-type anchors shall not be used as hold-down bolts.
 - c. When expansion or adhesive anchors are used for nonstructural applications such as equipment anchorage, 50 percent or alternate bolts in a group shall be tension tested, except that if the design load is less than 75 pounds, only one anchor in ten need be tested. See drawings for items with a design load of 75 pounds or less.
 - 1) Refer to Structural drawings for test values.
 2. The proof load may be applied by any method that will effectively measure the tension in the anchor, such as direct pull with a hydraulic jack, calibrated spring-loading devices, etc.
 3. If any anchor fails testing, test all anchors of the same category not previously tested until twenty (20) consecutive pass, then resume the initial testing frequency.
 - a. The cost of any additional testing as a result of failures shall be the responsibility of the Contractor at no additional cost to the Owner.
 4. When a drilled-in adhesive anchor is used in lieu of a required cast-in-place bolt, cost of testing shall be the responsibility of the Contractor at no additional cost to the Owner.
- B. Testing:
 1. Expansion Anchors:
 - a. Anchor diameter refers to the thread size for the WEDGE & SHELL categories, and to the anchor outside diameter for the SLEEVE category and Adhesive anchors.

- b. Apply proof test loads to WEDGE & SLEEVE anchors without removing the nut if possible. If not, remove nut & install a threaded coupler to the same tightness of the original nut using a torque wrench & apply load.
 - c. For SLEEVE/SHELL internally threaded categories, verify that the anchor is not prevented from withdrawing by a baseplate or other fixtures. If restraint is found, loosen and shim or remove fixture(s) prior to testing.
 - d. Reaction loads from test fixtures may be applied close to the anchor being tested, provided the anchor is not restrained from withdrawing by the fixture(s).
 - e. SHELL type anchors shall be tested as follows:
 - 1) Visually inspect 25 percent for full expansion as evidenced by the location of the expansion plug in the anchor body.
 - a) Plug location of a fully expanded anchor shall be as recommended by the manufacturer, or, in the absence of such compensation, as determined on the job site following the manufacturer's written installation instructions.
 - b) At least 5 percent of the anchors shall be proof loaded as indicated in the Test Values schedule on the drawings, but not less than three anchors per day for each different person or crew installing anchors.
or;
 - c) Test installed anchors per ACI 318 "Building code Requirements for Structural Concrete and Commentary."
2. Adhesive Anchors:
- a. Adhesive anchors shall be tension tested. The tension test load shall equal twice the allowable load for the specific location of the anchor to be tested (i.e., accounting for edge distance) or 80 percent of the yield strength of the bolt ($0.8A_bF_y$), whichever is less.
 - 1) The test procedure for expansion-type anchors in the test values table shall also be used for the adhesive anchors.
 - b. Where adhesive anchors are used as shear dowels across cold joints in slabs-on-grade and the slab is not part of the structural system, testing of those dowels is not required.
 - c. Anchors shall exhibit no discernible movement during the tension test.
3. Test equipment (including torque wrenches) is to be calibrated by an approved testing laboratory in accordance with standard recognized procedures.
- a. Alternate torque test procedures and test values for SHELL type anchors may be submitted to the enforcement agency for review and approval on a case-by-case basis when test procedures are submitted and approved by the enforcement agency.
4. The following criteria apply for the acceptance of installed anchors:
- a. **HYDRAULIC RAM METHOD:** The anchor should have no observable movement at the applicable test load. For wedge and sleeve type anchors, a practical way to determine observable movement is that the washer under the nut becomes loose.
 - b. **TORQUE WRENCH METHOD:** The applicable test torque must be reached within the following limits:
 - 1) Wedge or Sleeve Type: One-half (1/2) turn of the nut.
 - a) One-quarter (1/4) turn of the nut for the 3/8 inch sleeve anchor only.
 - 2) Torque testing of adhesive anchors is not permitted.
5. If the manufacturer's recommended installation torque is less than the test torque note in the table, the manufacturer's recommended installation torque shall be used in lieu of the tabulated values.
6. Testing should occur 24 hours minimum after installation of the subject anchors.

7. Required Maximum Test Values for Concrete, or Concrete Masonry Units in tension for the ranges and sizes of Drilled Anchors are shown on the drawings.

END OF SECTION

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SECTION 032000 – REINFORCEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all reinforcement material, labor, equipment and services necessary to completely install all reinforcing materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 03 11 01 CONCRETE FORMWORK
 4. 03 15 14 DRILLED ANCHORS
 5. 03 30 00 CAST-IN-PLACE CONCRETE
 6. 04 22 00 CONCRETE MASONRY UNITS
 7. 05 12 00 STEEL AND FABRICATIONS
 8. 31 00 00 OFFSITE DEVELOPMENT
 9. 31 20 00 EARTHWORK
 10. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 11. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. The following References and Manufacturer's Standards shall apply to this Specification Section:
1. ACI American Concrete Institute
 2. ASTM American Society for Testing and Materials
 3. AWS American Welding Society
 4. CRSI Concrete Reinforcing Steel Institute

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data:
 - a. Manufacturer's specification and installation instructions for splice devices.
 - 1) Bar supports.
 2. Shop Drawings
 - a. Detail in accordance with ACI 315 "Details and Detailing of Concrete Reinforcing".

- b. Indicate bending diagrams, assembly diagrams, splicing and laps of bars and shapes, dimensions and details of bar reinforcing and assemblies. Correctness of all reinforcing requirements and work is the responsibility of Contractor. Identify such shop drawings with reference thereon to sheet and detail numbers from Contract Drawings.
 - 1) Do not use scaled dimensions from Contract Drawings in determining the lengths of reinforcing bars.
 - 2) No reinforcing steel shall be fabricated without approved shop drawings.
 - 3) One of the required submittal copies shall be reproducible transparency.
 - 4) Any deviations from the contract documents must be clearly indicated as a deviation on the shop drawings.
 - 5) Areas of high congestion, including member joints and embed locations shall be fully detailed to verify clearances and assembly parameters and coordination with other trades.
 - c. Certificates of Compliance with specified standards:
 - 1) Reinforcing Bars.
 - 2) Welded wire fabric.
 - 3) Welding electrodes.
3. Samples
- a. Only as requested by Architect.
4. Quality Assurance/Control Submittals:
- a. Test Reports - Testing Laboratory shall submit to DSA/SSS, Project Inspector, Architect, Structural Engineer and the Contractor one (1) copy of each report showing results of test.
 - 1) Certified mill test reports of supplied reinforcing indicating chemical and physical analysis. Tensile and bend tests shall be performed by the mill in accordance with ASTM A 615 "Specification for Deformed and Plain Carbon-Steel Bars for Structural Concrete."
 - 2) Testing Laboratory reinforcement tests in accordance with CBC Table 1705A.2.1, CBC Section 1910A, and the provisions of Specification Section - TESTING LABORATORY SERVICES.
 - 3) Owner will pay for tests of samples taken from identified bundles accompanied by mill analysis.
 - b. Certificates of Compliance with specified standards:
 - 1) Reinforcing bars.
 - 2) Welded wire fabric.
 - 3) Welding electrodes.
 - 4) Welder's Certification.
5. Closeout Submittals:
- a. Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.
 - b. Warranty.

1.4 QUALITY ASSURANCE

A. Qualifications:

- 1. Installer Qualifications:
 - a. Installation shall be done only by an installation firm normally engaged in this business. All work shall be performed by qualified mechanics working under an experienced supervisor.

2. Welding Qualifications:
 - a. Welding procedures, welding operators and welders shall be qualified in accordance with AWS D1.4 - "Structural Welding Code Reinforcing Steel".
 - b. Welders shall be recently qualified by Test as prescribed in AWS "Standard Qualifications Procedure."
 - 1) Welders whose work fails to pass inspection shall be re-qualified before performing further welding.
3. Manufacturer/Supplier Qualifications:
 - a. Acceptable Manufacturers/Suppliers shall be regularly engaged in the manufacture of steel bar and wire fabric reinforcing.
4. Testing Laboratory will be approved by DSA/SSS, and selected by the Architect and the Owner.

B. Regulatory Requirements:

1. In accordance with Specification Section – REGULATORY REQUIREMENTS and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
2. General:
 - a. Reinforcement work shall conform to ACI 301 "Specifications for Structural Concrete for Buildings," and CBC Section 1905A as minimum standards.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:

1. Deliver reinforcement to Project plainly tagged, completely fabricated and ready to set.

B. Storage and protection:

1. Store reinforcement above the ground surface on platforms, skids or other supports, protected from dirt, rust, or other substances which will prevent bonding to the concrete.
2. Use all necessary care to maintain identification after bundles are taken apart.

1.6 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period: One (1) Year.

C. Installer's Warranty:

1. In accordance with the terms of the Specification Section - WARRANTIES.
 - a. Warranty Period: One (1) Year.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Deformed Bars: In accordance with ASTM A 706 "Low Alloy Steel Deformed Bars for Concrete Reinforcement" and ASTM A 615 "Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement," Grade as indicated on the structural drawings.
- B. Tie Wire: In accordance with ASTM A 82 "Cold Drawn Wire for Concrete Reinforcement," plain, cold-drawn steel.
- C. Welded Wire Fabric: In accordance with ASTM A 1064 "Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete".
- D. Steel Dowels: Same grade as bars to which dowels are connected.

2.2 ACCESSORIES

- A. Supports for Reinforcement: Provide bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening, deformed bars and welded wire fabric in place. Use wire bar-type supports complying with CRSI specifications.
 - 1. Supports and spacing of spacers per standards set forth by CRSI/WCRSI Manual of Standard Practice.
 - 2. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
 - 3. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are protected by plastic color to match adjacent concrete surfaces in accordance with CRSI Class I, or stainless steel in accordance with CRSI, Class II.
- B. Welding Electrodes: As per AWS D1.4 "Structural Welding Code for Reinforcing Steel".
- C. Mechanical Couplers: Mechanical Couplers shall develop 125 percent of the specified yield strength of the bars, and shall comply with ACI 318 "Building Code Requirements for Structural Concrete and Commentary", Section 12.14.3.

2.3 FABRICATION

- A. Bending: In accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary", except as modified by CBC Sections 1905A.
 - 1. Fabricate reinforcement in accordance with the requirements of ACI 315 "Details and Detailing of Concrete Reinforcement", where specific details are not shown.
 - 2. Inside diameter of bends for stirrups and ties shall not be less than 1-1/2 inches for No. 3 bars, 2 inches for No. 4 bars and 2-1/2 inches for No. 5 bars.

3. Where bent bars are straightened: field bending of bars will only be done in accordance with DSA/SSS approval per ACI 318 "Building Code Requirements for Structural Concrete and Commentary", Section 7.3.2. Steel reinforcement shall not be bent or straightened in a manner that will injure the material. Bars with kinks or bends not shown on the drawings shall not be used. Heating of bars will not be permitted.
 4. Provide offsets in rebar (1:6 maximum) where required to maintain clearances.
- B. Column ties shall terminate with a minimum turn of 135 degrees plus an extension of at least 6 bar diameters but not less than 4 inches at the free end of bar.
- C. Allowable Tolerances:
1. Fabrication:
 - a. Sheared length: 1 inch.
 - b. Depth of truss bars: Plus 0., minus 1/2 inch.
 - c. Ties: Plus or minus 1/2 inch.
 - d. All other bends: Plus or minus 1 inch.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Placing:
1. Place Reinforcement accurately.
 2. Do not move bars beyond allowable without concurrence of the Architect.
 3. Do not heat, bend, or cut bars without concurrence of the Architect.
 4. Reinforcement shall not be bent after being embedded in hardened concrete.
 5. Tie Reinforcement together at all intersections with Tie Wire.
 6. Support Reinforcing Bars by bar supports. Place and secure in accordance with CRSI "Specifications for Placing Bar Supports".
 7. Placement and support shall be complete.
 8. Do not use Reinforcing Bars with kinks or bends except when detailed on the structural drawings.
 9. Architect shall approve placement and support before concrete is deposited.
 10. Spiral reinforcing shall comply with ACI 318 "Building Code Requirements for Structural Concrete and Commentary".
- B. Spacing:
1. Clear space between parallel Reinforcing Bars shall not be less than 1 bar diameter nor less than 1 inch, unless otherwise noted on drawings.
- C. Splicing:
1. At splices, lap Reinforcing Bars 53 diameters minimum, unless otherwise indicated on Drawings.
 - a. Lap Splices: Tie securely with wire to prevent displacement of splices during placement of concrete.
 - b. Splice Devices: Install in accordance with manufacturer's written instructions.
 - 1) Obtain the Architect's review before using.
 - c. Do not splice bars except at locations shown without the concurrence of the Architect.

- 1) Where splices in addition to those indicated are required, indicate location on shop drawings clearly and highlight "for the Architect's approval".
 2. Stagger splices as indicated on drawings. Splice locations shall be as shown on drawings or shall be approved by Architect and DSA/SSS.
 - a. Near floors.
 - b. Ductile concrete columns must splice at the centerline of the column height.
 - c. As detailed on the drawings.
 3. Where vertical Reinforcing Bars are offset at a splice, the slope of the inclined portion of bar with the axis of the column or wall shall not exceed 1 in 6.
 4. Welded Wire Fabric:
 - a. Install in long lengths, lapping 24 inches at end splices and one mesh at side splices.
 - b. Offset laps in adjacent widths.
 - c. Place fabric in approximately the middle of the slab thickness unless otherwise shown on the drawings.
 - d. Wire tie lap joints at 12 inch centers.
 - e. Use concrete blocks to support mesh in proper position.
 5. Mechanical bar splices shall be approved by the Architect and DSA/SSS.
- D. Welding:
1. Welding is not permitted unless specifically detailed on Drawings or approved by the Architect.
 2. Weld under supervision of qualified Testing Laboratory selected by Owner. Cost of supervision to be paid by the Owner. Weld only ASTM A 706 "Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement," unless otherwise noted.
 3. Employ shielding metal-arc method and meet requirements of AWS D1.4 "Structural Welding Code for Reinforcing Steel."
 4. Welding is not permitted on bars where carbon equivalent is unknown or is determined to exceed 0.55.
 5. Welding shall not be done within two bar diameters of any bent portion of a bar which has been bent cold.
 6. Welding of crossing bars is not permitted.
 7. Provide material properties supplemental report for bars other than ASTM A706 "Low Alloy Steel Deformed Bars for Concrete Reinforcement".
 8. Weld in accordance with AWS D1.4 "Structural Welding Code for Reinforcing Steel".
 - a. Weld only where indicated on the drawings.
 - b. Weld only ASTM A 615 "Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement", unless otherwise approved by the Architect and DSA/SSS.
 9. Inspection provided per CBC Table 1705A.3.
- E. Allowable Tolerances:
1. Placement:
 - a. Concrete cover to form surfaces: Plus or minus 1/4 inch.
 - b. Minimum spacing between bars: Plus or minus 1/4 inch.
 - c. Crosswise of members: Spaced evenly with 2 inches of stated separation.
 - d. Lengthwise of members: Plus or minus 2 inches.
 2. Maximum bar movement to avoid interference with other reinforcing steel, conduits, or embedded items: 2 bar diameters.
- F. Drawing Notes: Refer to notes on drawings for additional reinforcement requirements.

- G. Mechanical, Electrical and Plumbing Drawings:
1. Refer to Mechanical, Electrical and Plumbing drawings for formed concrete requiring reinforcing steel.
 2. All such steel shall be included under the work of this section.

3.2 CONSTRUCTION

- A. Corrective Measures:
1. Notify Architect if conduit, piping, inserts, sleeves, etc. interfere with placement of Concrete Reinforcement as indicated on Drawings. Notify Architect immediately if any Concrete Reinforcement is found to be misplaced after concrete has been poured.
 2. Do not cut, bend, kink or hickey misplaced reinforcement.
 3. Make corrections only as directed by Architect and approved by DSA/SSS.
 4. This Contractor shall bear the cost of any alteration, corrections or replacements of Concrete Reinforcing to concrete required because of misplaced reinforcement.

3.3 FIELD AND QUALITY CONTROL

- A. Site Tests:
1. When inspections are indicated for reinforcement placement on the Structural drawings, a special inspector shall be employed to inspect reinforcing placement per CBC Table 1705A.3.
 2. Inspect shop and field welding in accordance with AWS D1.4 "Structural Welding Code for Reinforcing Steel", including checking materials, equipment, procedure and welder qualifications as well as the welds. Inspector will use non-destructive testing or any other aid to visual inspection that he deems necessary to assure himself of the adequacy of the weld.
- B. Inspections:
1. All reinforcing steel whose properties are not identifiable by mill test reports shall be tested in accordance with ASTM A 706 "Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement". One series of tests shall be performed for each missing report. Contractor shall pay for test required due to lack of positive identification, by means of a back charge by the Owner.
 2. When tests are indicated for reinforcing steel on the structural drawings, the reinforcing steel used shall be tested in accordance with ASTM A 615 "Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement". One tensile and one bend test for each 2-1/2 tons of steel or fraction thereof, shall be made.
- C. Tests and Inspection shall be performed by Owner's Testing Laboratory except when needed to justify rejected work, in which case the cost of re-tests and re-inspection shall be borne by the Contractor.

3.4 CLEANING

- A. Reinforcement, at time concrete is placed, shall be free of loose rust scale, mud, oil or other coating that will destroy or reduce the bond.

END OF SECTION

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install all Cast-In-Place Concrete materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - a. Footings.
 - b. Foundation Walls.
 - c. Slab on Grade.
 - d. Site Improvements.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 03 11 01 CONCRETE FORMWORK
 4. 03 15 14 DRILLED ANCHORS
 5. 03 20 00 REINFORCEMENT
 6. 03 35 00 POLISHED CONCRETE FINISHING
 7. 04 22 00 CONCRETE MASONRY UNITS
 8. 05 12 00 STEEL AND FABRICATIONS
 9. 05 30 00 METAL DECK
 10. 06 10 00 ROUGH CARPENTRY
 11. 07 14 16 FLUID-APPLIED WATERPROOFING
 12. 07 18 50 VAPOR-ALKALINITY CONTROL
 13. 07 92 00 SEALANTS
 14. 08 16 13.01 FIBERGLASS DOORS AND FRAMES
 15. 09 22 16 METAL FRAMING
 16. 09 65 10 RESILIENT BASE AND ACCESSORIES
 17. 09 91 00 PAINTING
 18. 10 05 00 MISCELLANEOUS SPECIALTIES
 19. 10 14 00 IDENTIFYING DEVICES
 20. 10 14 53 ROAD AND PARKING SIGNAGE
 21. 10 21 13 TOILET PARTITIONS
 22. 11 66 43 SCOREBOARDS
 23. 31 00 00 OFFSITE DEVELOPMENT
 24. 31 20 00 EARTHWORK
 25. 31 31 00 SOIL TREATMENT
 26. 32 12 00 PAVEMENT
 27. 32 19 19 ORNAMENTAL METAL
 28. 32 31 13 CHAIN LINK
 29. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 30. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:

1. In accordance with the following standards:
 - a. ACI American Concrete Institute
 - b. ASTM American Society of Testing Materials.
 - c. RFCI The Resilient Floor Covering Institute
 - d. RIS Redwood Inspection Service
 - e. RMAI Rubber Manufacturers Association Inc.

1.3 SYSTEM DESCRIPTION

A. Design Requirements:

1. Make ready all interior concrete substrates to receive flooring:
 - a. Ensure the proper levelness and flatness of all concrete substrates for the intended flooring products.
 - 1) If leveling materials are required because of inadequate leveling during the pour and curing periods, follow all manufacturers written instructions for the proper preparation and application of these products.
 - 2) Verify that the concrete substrates are at the right RH (Relative Humidity) and Alkalinity Levels for the leveling materials in accordance with manufacturers written instructions.
 - b. Keep finished concrete substrates clean and ready for scheduled flooring applications during the construction process.
 - 1) Protect those substrates from excessive moisture build-up, and keep free of moisture puddles.
 - 2) Ensure that construction equipment does not leak fluids on substrates that would prevent bonding of flooring adhesives at the proper time for flooring installations.
 - c. Provide concrete substrates that are within acceptable limits of RH and that the Alkalinity of the concrete substrates are within the acceptable levels for adhesively applied flooring at the scheduled time for flooring installations.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

1. Coordination Drawings:
 - a. Layout drawings for construction, control and expansion joints.
 - 1) Coordinate joints with floor patterns.
2. Product Data.
 - a. Submit data on all products listed under MATERIALS, and ACCESSORIES within this specification section.
3. Quality Assurance/Control Submittals:
 - a. Coordinate with Specification Section - TESTING LABORATORY SERVICES for additional Testing Requirements as required by DSA.
 - b. Material samples and mix designs:

- 1) Material samples and mix designs as required for testing shall be submitted to Architect at least fourteen (14) days prior to any concrete work and shall include results of test data used to establish proportions.
 - a) Grout samples and colors for colored surfaces upon Architect's request only.
 - c. Continuous batch plant inspection required per CBC Section 1705A.3.3, or may be waived per CBC Section 1705A.3.3.2.
 - d. Test Reports:
 - 1) Testing Laboratory shall submit to Architect, Structural Engineer, Owner, and to the DSA one (1) copy of each report showing results of tests.
 - a) Report shall state whether materials were in conformance with specifications.
 - b) Report shall state whether the curing of the concrete slabs are within parameters required for future flooring installations.
 - 2) Moisture and Alkalinity Tests.
 - a) Relative Humidity (RH).
 - b) Moisture Vapor Emission Report (MVER).
 - e. Certificates:
 - 1) Submit three (3) copies of certificates.
 - a) Provide Vapor Retarder manufacturer's certificate of inspection and compliance to installation procedures.
 - b) Cement manufacturer's Mill Certificate of Compliance with the specification.
 - c) Certificates for aggregates and admixtures.
4. Closeout Submittals:
- a. Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.
 - b. Warranty.

1.5 QUALITY ASSURANCE

- A. Qualifications:
1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 2. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the Work.
 3. Testing Laboratory Qualifications:
 - a. Qualified Testing Laboratory and personnel approved by DSA.
 - 1) Cost of testing and inspection will be paid by the Owner unless otherwise specified. The Owner shall pay all costs of re-inspection and/or re-tests due to non-compliance with specifications and/or failures, but the Contractor shall reimburse the Owner for these tests when billed or deducted from its payment.
- B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:

- a. All materials, equipment and placing operations shall be subject to inspection, tests and approval at all items. Testing Agent shall have free and unhampered access to all places where concrete materials are stored proportioned and mixed.
- b. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Mockups:

1. Provide mockups prior to application of work and prior to installation of any materials.
2. Mockups shall be used for establishing construction sequences, installation requirements of materials, and shall be representative for the intended end-use configuration.
3. Mockup Assemblies:
 - a. Polished Concrete Finishing: Mockups shall be the placement of concrete and shall integrate all other related work, but not limited to, Specification Section - POLISHED CONCRETE FINISHING.
 - b. Slab-On-Grade: Mockups shall be the finish and texture of concrete.
 - 1) Mockups shall be a minimum overall size of 3' x 3' x 4" thick panels.
 - 2) Provide Mockups for each texture and finish required.
4. Installation of Mockups:
 - a. The Project Inspector, the Architect, and Contractor's Superintendent shall observe the installation of materials and work.
 - b. Installation crew for the Mockups shall be the Cast-In-Place Concrete, Reinforcement and Polished Concrete Finishing installers for this project and installers, as necessary, of other related work.
 - c. Unacceptable Mockups shall be removed and reinstalled until the work is deemed to be in compliance with the project requirements and is acceptable by the Owner, Architect and Project Inspector.
5. Allow 24 hours for inspection of mockup before proceeding with work.
6. Protect the Mockups during the course of construction.
7. Remove mockup and dispose of materials when no longer required and when directed by the Architect at the end of the project.

D. Meetings:

1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with other related work being performed.
 - 1) Schedule pre-construction conference with Vapor Retarder Manufacturer prior to installation at least one week prior to scheduled installation.
 - 2) Schedule pre-construction conference with Polished Concrete Contractor prior to installation to discuss specific requirements of the Polished Concrete Finishing requirements. Coordinate with Specification Section - POLISHED CONCRETE FINISHING.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
 - c. Prior to submitting design mixes, review detailed requirements for preparing concrete design mixes and determine procedures for satisfactory concrete operations.
 - d. Review requirements for submittals, status of coordinating work, and availability of materials.
 - e. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications.

2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - 1) Schedule installation review at the start of installation with the Vapor Retarder Manufacturer to ensure all of the manufacturers written instructions are complied with.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - 1) Prior to covering up the Vapor Retarder installation with concrete, have the Vapor Retarder manufacturer inspect and provide a certified report to the Architect the condition of the Vapor Retarder prior to being covered with concrete, and that the installation was in full compliance with the manufacturer's written instructions.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 PROJECT CONDITIONS

A. Environmental requirements:

1. Cold Weather Requirements:
 - a. Do not pour concrete unless air temperature is at least 40 degrees Fahrenheit and rising.
 - b. Do not pour concrete on frozen ground or ice.
 - c. Heat and otherwise prepare materials in accordance with ACI Standard 306.
 - d. Maintain concrete temperature at 50 degrees Fahrenheit (minimum) the first three (3) days after pouring. Protect concrete from freezing the first six (6) six days, after placing.
2. Hot Weather Requirements:
 - a. Do not pour when temperature exceeds 90 degrees Fahrenheit.
 - b. During hot weather, proper attention shall be given to ingredients, production methods, handling, placing, protection, and curing to prevent excessive Concrete temperatures or water evaporation, which will impair the required strength or serviceability of the member or structure.

1.7 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period: One (1) Year.

C. Installer's Warranty:

1. In accordance with the terms of the Specification Section - WARRANTIES
 - a. Warranty period: One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Cement:
 - a. Natural (Grey) Portland Cement:
 - 1) LEHIGH PORTLAND CEMENT COMPANY.
 - 2) TXI CEMENT COMPANY (formerly RIVERSIDE WHITE CEMENT).
 - b. White Cement:
 - 1) LEHIGH WHITE CEMENT
 - 2) TXI CEMENT COMPANY (formerly RIVERSIDE WHITE CEMENT).
 2. Admixtures:
 - a. Water Reducing, High Range:
 - 1) W.R. GRACE CONSTRUCTION PRODUCTS.
 - b. Fiber Reinforcing
 - 1) Specified product manufacturer: EUCLID.
 - a) TUF-STRAND SF.
 - c. Integrally Colored Concrete Color Pigment:
 - d. Shrinkage Control:
 - 1) Specified product manufacturer: SIKA CONTROL-40.
 - 2) Acceptable alternative product manufacturer:
 - a) EUCLID: "Eurcon SRA Floor".
 - e. Integral Concrete Waterproofing:
 - 1) Specified product manufacturer: XYPEX.
 - a) ADMIX C-500.
 3. Vapor Retarders:
 - a. Specified product manufacturer: STEGO INDUSTRIES.
 - 1) "Stego-Wrap" ("Yellow" color).
 - b. Acceptable alternative product manufacturers:
 - 1) EPRO SERVICES, INC.: "Ecoshield-E15" ("Red" color).
 - 2) W.R. MEADOWS: "Perminator 15" ("Green" color).
 4. Bonding Agents:
 - a. Specified product manufacturer: CONRAD SOVIG CO., INC.
 - 1) "Cemlok-NE."
 - b. Acceptable alternative product manufacturers:
 - 1) THE EUCLID CHEMICAL COMPANY: "Euoweld."
 - 2) LARSON PRODUCTS CORPORATION: "Weld-Crete."
 - 3) SONNEBORN: "Sonobond."
 - 4) W.R. GRACE CONSTRUCTION PRODUCTS: "Darweld C."
 - 5) W.R. MEADOWS: "Deck-O-Weld."
 5. Epoxy Adhesives and Mortar Materials:

- a. Specified product manufacturer: W.R. MEADOWS.
 - 1) "Rezi-Weld," "LV, 1000" or "Gel-Paste" as suitable for application.
- b. Acceptable alternative product manufacturers:
 - 1) THE EUCLID CHEMICAL COMPANY: "Euco #456."
6. Epoxy Concrete Mortar:
 - a. Specified product manufacturer:
 - 1) GENERAL POLYMER CORPORATION: "TPM 115."
 - b. Acceptable alternative product manufacturers:
 - 1) ANTI-HYDRO CORPORATION: "A-H Emery Epoxy Topping #170."
7. Concrete Mortar:
 - a. Specified product manufacturer:
 - 1) THE EUCLID CHEMICAL COMPANY: "Euco."
 - b. Acceptable alternative product manufacturers:
 - 1) MASTER BUILDERS: "Embeco 411-A."
8. Concrete Sack and Patch:
 - a. Specified product manufacturer:
 - 1) THE EUCLID CHEMICAL COMPANY: "Tammspatch II".
 - b. Acceptable alternative product manufacturers:
 - 1) MASTER BUILDERS: "Embeco 411-A"
9. Non-Shrink Grout:
 - a. Specified product manufacturer:
 - 1) MINWAX CONSTRUCTION PRODUCTS COMPANY
 - a) "POR-ROK", Epoxy Grout.
 - b. Acceptable alternative product manufacturers:
 - 1) MASTER BUILDERS: "713."
 - 2) MASTER BUILDERS: "928."
10. Drypack Grout Materials:
 - a. Specified product manufacturer:
 - 1) THE EUCLID CHEMICAL COMPANY: "Euco Dry Pack Grout."
 - b. Acceptable alternative product manufacturers:
 - 1) W.R. MEADOWS: "Pac-It Grout."
11. Waterstops:
 - a. Specified product manufacturer:
 - 1) GREENSTREAK PLASTIC PRODUCTS COMPANY.
 - a) Polyvinyl Chloride Type.
12. Fiber Expansion Joint Filler:
 - a. Specified product manufacturer:
 - 1) W.R. MEADOWS: "Sealtight Fiber Expansion Joint Filler."
 - b. Acceptable alternative product manufacturer:
 - 1) CELOTEX CORP.: "Flexcell."
 - 2) PHILLIP CAREY MFG. CO.: "Elastic Fiber Expansion Joint."
13. Semi-Rigid Joint Filler:
 - a. Specified product manufacturer:
 - 1) W.R. MEADOWS: "Rezi-Weld Flex."
14. Curing Paper:
 - a. Specified product manufacturer:
 - 1) FORTIFIBER CORPORATION: "Orange Label Sisalkraft."
15. Slab Curing Compound (SCC):
 - a. Specified product manufacturer:

- 1) THE EUCLID CHEMICAL COMPANY: "Cure-Crete WB."
 - b. Acceptable alternative product manufacturers:
 - 1) W.R. MEADOWS: "Sealtight 1100 CLEAR."
 16. Clear Floor Sealer (CFS):
 - a. Specified product manufacturer:
 - 1) THE EUCLID CHEMICAL COMPANY: "Diamond Clear VOX."
 - b. Acceptable alternative product manufacturers:
 - 1) W.R. MEADOWS: "Sealtight VOComp 25."
 17. Cementitious Based Underlayment Compound (CBUC):
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Concrete:
1. Cement: Type I or II in accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary," Chapter 3, and ASTM C 150 "Specifications for Portland Cement."
 - a. Provide Sack and Patch material when the Project requires patching for defective work, to match adjacent material color. See Specification Section - CAST-IN-PLACE CONCRETE, Part 3 Article titled "APPLICATIONS," the paragraph titled "Sack Finish."
 2. Water: Clean and free from deleterious amounts of acids, alkalis, salts, organic material, or other substances that may be deleterious to concrete or reinforcing.
 3. Aggregates:
 - a. Normal weight aggregates in accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary," Chapter 3 and ASTM C33 "Standard Specifications for Concrete Aggregates." Crushed Granite or "Perkins" type aggregates are acceptable materials.
 - 1) Maximum Aggregate Size: 1-1/2 inches for standard aggregate.
 - 2) Coarse aggregate when tested in accordance with State of California Highways Test Methods 227 shall have a cleanliness value of 75 minimum.
 - 3) Fine aggregates when tested in accordance with State of California Highways Test Methods 217 shall have a sand equivalent of 75 minimum.
 4. Admixtures: Admixtures shall be in accordance with the provisions of ACI 318 "Building Code Requirements for Structural Concrete and Commentary," Section 3.6, and shall not be used until prior approval from DSA has been obtained. Calcium Chloride is not permitted.
 - a. Fly Ash (Not to exceed 15 percent of the total cementitious material per DSA):
 - 1) Conform to ASTM C 618 "Specification for Coal Fly Ash and Raw or Calcined Natural Possolan for Use in Concrete."
 - 2) Class "C" Fly Ash is not permitted per CBC 1903A.6.
 - b. Water Reducing, High Range: On approval of DSA, the Architect and the Structural Engineer, the Contractor may use a High Range Water Reducing Admixture complying with ASTM C 494 "Specification for Chemical Admixtures for Concrete." Use one of the following materials:
 - 1) Finish Enhancing Water Reducer; "ADVA 170" by GRACE Construction Products, or approved equivalent.

- a) ASTM C 494 "Specification for Chemical Admixtures for Concrete," Type F.
- c. Fiber Reinforcing:
 - 1) Polypropylene / polyethylene macro synthetic fiber, complying with ASTM C 1116 "Standard Specification for Fiber Reinforced Concrete and Shotcrete."
 - 2) Suitable for Slab On Grade and Above Grade Slab Construction.
 - 3) UL Certified for composite metal deck construction.
- d. Integrally Colored Concrete Color Pigment:
- e. Shrinkage Control:
 - 1) Conform to ASTM C 494 "Specification for Chemical Admixtures for Concrete," Type S.
 - 2) Verify and provide Shrinkage control compatible with Polished Concrete Finishing.
- f. Integral Concrete Waterproofing:
 - 1) Crystalline Waterproofing: Prepackaged, gray-colored proprietary blend of portland cement, specially treated sand, and active chemicals that, when mixed with water and applied, penetrates into concrete and reacts chemically with the byproducts of cement hydration in the presence of water to develop crystalline growth within substrate capillaries to produce an impervious, dense, waterproof substrate.

B. Rock Base:

- 1. Clean mixture of crushed stone or uncrushed gravel, in accordance with ASTM D 448 "Standard Classification for Sizes of Aggregate for Road and Bridge Construction."
 - a. Top Layer:
 - 1) Percent passing a 1-inch sieve: 100 percent.
 - 2) Percent passing No. 8 sieve: 0 to 5 percent.
 - b. Bottom Layer:
 - 1) Percent passing a 2-inch sieve: 100 percent.
 - 2) Percent passing No. 8 sieve: 0 to 5 percent.

C. Sand Base:

- 1. Sand to be washed and of natural siliceous or igneous origin, having hard, strong, and durable particles.
- 2. Sand shall comply with ASTM C 33 "Specification for Concrete Aggregates," generally as follows:
 - a. Percent passing 3/8 inch sieve: 100 percent.
 - b. Percent passing No. 4 sieve: 95 to 100percent.
 - c. Percent passing No. 50 sieve: 10 to 30 percent.
 - d. Percent passing No. 100 sieve: 2 to 10 percent.

D. Vapor Retarder:

2.3 ACCESSORIES

- A. Bonding Agents: Polyvinyl acetate or acrylic base, mixed in accordance with the manufacturer's written recommendations.
- B. Mortar:
 - 1. Site Mix:

- a. Composed of Concrete Materials indicated in Specification Section - CAST-IN-PLACE CONCRETE, Part 2 Article titled "MATERIALS."
 - 1) Mix: One part cement to 3 parts aggregate (all aggregate shall pass No. 4 sieve).
 - 2) Mixing: Thoroughly mixed in accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary."
 2. Concrete Mortar:
 - a. Greater than 1/4 inch thick: Floor leveling, patching and repair, non-shrink trowel applied concrete mortar where repair areas of fill.
 3. Epoxy Concrete Mortar:
 - a. Less than 1/4 inch thick: Floor leveling, non-shrink trowel applied epoxy concrete mortar where repair areas to fill.
 4. Epoxy Mortar and Adhesive Materials:
 - a. Modified Polyamide, high modulus mortar, strength to match adjacent concrete or greater, in accordance with ASTM C 881 "Specification for Epoxy-Resin-Base Bonding Systems for Concrete," Grade 1, Type III, Class B & C, and in accordance with ACI 503.4, mixed in accordance with the manufacturer's written recommendations.
- C. Grout:
1. Strength to match adjacent concrete or greater, composed of Concrete Materials indicated in Specification Section - CAST-IN-PLACE CONCRETE, Part 2 Article titled "MATERIALS."
 - a. Mix: Same proportions as concrete mix except omit coarse aggregate and adjust water to produce a thick consistency. Provide mix design per CBC Section 1904A.2.
 - b. Mixing: In accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary," mixed in accordance with the manufacturer's written recommendation.
 2. Non-Shrink Grout: Flowable, non-shrink, self-leveling, non-staining, non-metallic grout, strength to match adjacent concrete or greater, and in compliance with ASTM C 1107 "Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)," mixed in accordance with the manufacturer's written recommendation.
 3. Drypack Grout: Non-staining, non-shrink, non-metallic grout, strength to match adjacent concrete or greater, and in accordance with ASTM C 1107 "Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)," mixed in accordance with the manufacturer's written recommendation.
- D. Waterstops: Provide polyvinyl chloride type waterstops, model number and size to fit the construction required, in accordance with the Corps of Engineers standard CRD-C 572.
- E. Fiber Expansion Joint Filler: 1/4" thick at vertical joints and 1/2" thick under thresholds (unless specifically noted otherwise), asphalt saturated fiber expansion joint filler, in accordance with ASTM D 1751 "Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)."
- F. Semi-Rigid Joint Filler: Two-component, semi-rigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240 "Standard Test Method for Rubber Property Ó Durometer Hardness."
- G. Curing Paper (Absorptive Covers): Products complying with:
1. ASTM C 171 "Specification for Sheet materials for Curing Concrete."

- H. Slab Curing Compound (SCC): Provide liquid-type membrane-forming sealing compound, non-yellowing, VOC compliant cure and seal, complying with ASTM C 309 "Specification for Liquid Membrane-Forming Compounds for Curing Concrete," Type I, Class A, that when dry is clear in color. Moisture loss not more than 0.55 kg/sq. meter when applied at 200 sq.ft./gal.
- I. Clear Floor Sealer (CFS): Provide liquid-type membrane-forming sealing compound, non-yellowing, VOC compliant cure and seal, complying with ASTM C 309 "Specification for Liquid Membrane-Forming Compounds for Curing Concrete," Type I, Class A, that when dry is clear in color. Moisture loss not more than 0.55 kg/sq. meter when applied at 200 sq.ft./gal.
- J. Sack Finish Materials: For repair and patching of defective areas.
1. Provide sack finish materials composed of Concrete Materials indicated in Specification Section - CAST-IN-PLACE CONCRETE, Part 2 Article titled "MATERIALS." Sand shall be fine.
- K. Cementitious Based Underlayment Compounds (CBUC): Provide free-flowing, self-leveling, pumpable, cement based compound for applications from 1-1/4 inch thick to feathered edges, 4500 psi minimum in accordance with ASTM C 109 "Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. (or 50-mm) Cube Specimens)."

2.4 MIXES

- A. Mix Design and Proportions in accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary:"
1. Initial mix design shall be prepared for all concrete by recognizing testing laboratory (approved by Architect). In the event that additional mix designs are required due to depletion of aggregate sources, aggregate not conforming to Specifications, or at request of Contractor, these mixes shall be prepared as above.
 2. Contractor shall notify the Testing Laboratory and Architect of intent to use concrete pumps to place concrete so that mix designs can be modified accordingly.
 3. Mix designs with Fly Ash and/ or Pozzolans content greater than 15 percent of the total weight of cementitious materials shall be proportioned by ACI 318 "Building Code Requirements for Structural Concrete and Commentary" and DSA IR 19-3 "Fly Ash and Natural Pozzolans used in Concrete."
 4. Owner's testing laboratory shall review all mix design before submittal.
 5. All concrete shall have the following minimum compressive strengths in accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary" at 28 days and shall be proportioned within the following limits:
 - a. Foundations: Use for unexposed foundation concrete except as otherwise specified:
 - 1) Strength: 3,000 psi at 28 days.
 - 2) Max. Aggregate Size: 1-1/2 inch.
 - 3) Max. Water/Cement Ratio: 0.58.
 - 4) Admixture: Water Reducing.
 - 5) Weight: 145 pcf.
 - b. Building Slab On Grade: Use for interior building slab on grade, except as otherwise specified:
 - 1) Strength: 4,000 psi at 28 days.
 - 2) Max. Aggregate Size: 1 inch.
 - 3) Max. Water/Cement Ratio: 0.45.

- 4) Admixture: Water Reducing + Fly Ash.
- 5) Weight: 145 pcf.
- c. Structural Concrete: Use for columns, beams and walls, except as otherwise specified:
 - 1) Strength: 4,000 psi at 28 days.
 - 2) Max. Aggregate Size: 1 inch.
 - 3) Max. Water/Cement Ratio: 0.50.
 - 4) Admixture: Water Reducing.
 - 5) Weight: 145 pcf.
- d. Site: Use for exterior concrete slabs on grade such as walks, site work, mechanical and electrical pads and miscellaneous site items:
 - 1) Strength: 3,000 psi at 28 days.
 - 2) Max. Aggregate Size: 1 inch.
 - 3) Max. Water/Cement Ratio: 0.60.
 - 4) Admixture: Water Reducing.
 - 5) Weight: 145 pcf.
- e. Site: Site Concrete indicated on Civil Drawings:
 - 1) Refer to Specification Section - CONCRETE PAVING.
- f. Pool Deck Slab On Grade:
 - 1) Refer to Specification Section - SWIMMING POOL CONCRETE.
- g. Swimming Pool Structure:
 - 1) Refer to Specification Section - SWIMMING POOL CONCRETE.
- h. Architectural: Used for Curved and Straight Concrete Seat Walls:
 - 1) Strength: 3,500 psi at 28 days.
 - 2) Max. Aggregate Size: 3/8 inch.
 - 3) Max. Water/Cement Ratio: 0.60.
 - 4) Admixture: Plasticizing admixtures used to create maximum workability at minimum slump.
 - 5) Weight: 145 pcf.
- i. Lean mix: Used for Back Fill of over excavated trenches, encasement of all penetrations, plumbing pipe, mechanical pipe under footings (plumbing & mechanical pipes and electrical conduits):
 - 1) Strength: 1,500 psi at 28 days.
 - 2) Max. Aggregate Size: 3/8 inch.
 - 3) Max. Water/Cement Ratio: 0.62.
 - 4) Admixture: None.
 - 5) Weight: 145 pcf.

- B. Consistency of Concrete: Concrete slump, measured in accordance with ASTM C 143 "Test method for Slump of Hydraulic-Cement Concrete," shall fall within the following limits:
- 1. For General concrete placement: 3 inch plus or minus 1 inch.
 - a. Polished Concrete Mix: 5" maximum.
 - 2. Mixes employing the specified high range water reducer shall provide a measured slump not to exceed 7 inch +/- 1 inch after dosing, 2 inch +/- 1 inch before dosing.
 - a. Polished Concrete Mix: 6" maximum if using water reducing admixture in lieu of water.
 - 3. Concrete slump shall be taken at point of placement. Use water reducing admixtures as required, to provide a workable consistency for pump mixers. Water shall not be added in route by truck or at the jobsite without written review by the Architect.

C. Mixing:

1. Equipment: All concrete shall be machine mixed. Provide adequate equipment and facilities for accurate measurement and control of materials.
2. Method of Mixing to comply with ACI 318 "Building Code Requirements for Structural Concrete and Commentary:"
 - a. Transit Mixing: Comply with ASTM C 94 "Specification for Ready-Mixed Concrete." Ready mixed concrete shall be used throughout, except as specified below.
 - 1) On-Site Mixing: Use only if method of storing material, mixing of material and type of mixing equipment is approved by Architect.
 - 2) Approval of site mixing does not relieve Contractor of any other requirements of Specifications.
3. Mixing Time: After mix water has been added, concrete shall be mixed not less than 1-1/2 minutes nor more than 1-1/2 hours. Concrete shall be rejected if not deposited within the time specified.
4. Admixtures:
 - a. Use automatic metering dispenser to introduce admixture into mix. Dispenser shall be recommended and calibrated by admixture manufacturer.
 - 1) Integrally Colored Concrete Color Pigment: Follow the manufacturers written recommendations for proper mixing of the selected pigment color.
 - b. Water Reducers may be used in concrete slabs on grade identified with a Polished Concrete Finish - coordinate with Specification Section - POLISHED CONCRETE FINISHING.
 - c. Admixtures shall be charged into mixer as a solution and shall be dispensed by an automatic dispenser or similar metering device. Powdered admixtures shall be weighed or measured by volume as recommended by manufacturer. Accuracy of measurement of any admixture shall be within plus or minus 3 percent.
 - d. Two or more admixtures may be used in same concrete, provided such admixtures are added separately during batching sequence, and provided further that admixtures used in that combination retain full efficiency and have no deleterious effect on concrete or on properties of each other.
 - e. All admixtures are to be approved by Architect prior to commencing this work.
5. Re-tempering:
 - a. Concrete shall be mixed only in quantities for immediate use. Concrete, which has set shall be discarded, not re-tempered.
 - b. Indiscriminate addition of water to increase slump is prohibited.
 - c. When concrete arrives at project with slump below what is suitable for placing, water may be added only if neither maximum permissible water-cement ratio nor maximum slump is exceeded.
 - 1) Water shall be incorporated by additional mixing equal to at least half of total mixing time required.
 - 2) Any addition of water above that permitted by limitation of water-cement ratio shall be accompanied by a quantity of cement sufficient to maintain proper water-cement ratio.
 - 3) Such additions shall only be used if approved by the Architect.
 - 4) In any event, with or without addition of cement, not more than 2 gallons of water per cubic yard of concrete, over that specified in the design mix, shall be added.
6. Cold Weather Batching: When temperature is below 40 degrees F, or is likely to fall below 40 degrees F during a 24 hour period after placing, provide adequate equipment for heating concrete materials.
 - a. No frozen materials or materials containing ice shall be used.

- b. Temperatures of separate materials, including mixing water, when placed in mixer shall not exceed 100 degrees F.
 - c. When placed in forms, concrete shall have a temperature between 50 degrees F and 85 degrees F.
7. Hot Weather Batching: Concrete deposited in hot weather shall have a placing temperature below 85 degrees F. If necessary, ingredients shall be cooled to accomplish this.

2.5 FINISHES

A. Slab Finishes:

- 1. Tooled Finishes:
 - a. Scratch Finish: Apply scratch finish to slab surfaces to receive concrete floor topping or mortar setting beds for tile, and other bonded applied cementitious finish flooring material.
 - b. Float Finish: Apply float finish to slab surfaces to receive trowel finish and other finishes as specified; membranes, elastic waterproofing, elastic roofing, or sand-bed terrazzo.
 - c. Trowel Finish: Apply a non-slip trowel finish to surfaces to be covered with resilient flooring, thin-set ceramic or quarry tile, paint or another thin film-finish coating system
 - d. Broom Finish: All concrete paving and concrete finishes, and exterior concrete platforms, steps, ramps and other areas requiring non-slip finishes, unless otherwise indicated, shall have a non-slip broom finish (as defined by PCA - Portland Cement Association "Design and Control of Concrete Mixtures") applied in the following manner:
 - 1) Medium Broom Finish.
 - a) 1/16" reveal.
 - 2) Rough Broom Finish.
 - a) 1/8" reveal.
- 2. Applied Finishes:
 - a. Slab Curing Compound (SCC): Used as a curing compound for exterior slabs on grade with no flooring applications.
- 3. Repair finishes (Vertical surfaces):
 - a. "Sack Finish:" Applied to defective surfaces mixed to the color and consistency required to match the adjacent materials in color and strength.

2.6 SOURCE QUALITY CONTROL

A. Test, Inspection:

- 1. Inspection of Mix:
 - a. Quality and quantity of material used shall be subject to continuous inspection by a qualified person. Sampling and testing of cement and aggregates in accordance with Title 24, Part 1, Section 4-335, and CBC Section 1705A, and Table 1705A.3.
 - b. Maintain sources of material supply constantly after approval of concrete mix.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

1. Contractor shall inspect bearing soil and report soft or loose unsuitable bearing soil to Architect.
2. Architect will furnish Contractor with corrective measures necessary to remedy field condition.
3. Do not pour concrete until suitable bearing surfaces are achieved.
4. At Engineered Fill, remove soft and loose unsuitable fill and replace with concrete. Cost shall be paid by Contractor.
5. Contractor shall inspect and identify any site conditions and/or design information that prevents the Contractor from complying with the laws, regulations and/or building codes governing ADA access compliance.

3.2 PREPARATION

A. Transportation of Concrete:

1. Handle Concrete from mixer to place of final deposit as rapidly as practical by methods which shall prevent the separation or loss of the ingredients in accordance with ACI 304.3R "Heavyweight Concrete Measuring, Mixing, Transporting, and Placing."
2. Do not move concrete horizontally by means of vibrators.
3. Deposit concrete as nearly as practical at its final position in a manner which, will ensure that required quality is obtained.
4. Chutes shall slope not less than 4 inches and not more than 6 inches per foot of horizontal run.

B. Protection:

1. At old concrete or concrete which has begun to set upon which Concrete is to be placed:
 - a. Surface shall be level, cleaned of all laitance and rough with solidly embedded large aggregate exposed.
 - b. Rough surface by chipping entire surface not earlier than 5 days after set, by high pressure hosing (80 pounds per square inch) 2 to 4 hours after placing or by sand blasting with coarse silica sand, roughness amplitude shall be at least 1/4 inch.
 - c. Not more than 1/2 hour prior to pouring concrete, place 2 inch thick uniform layer of grout on old concrete.

C. Surface preparation:

1. Prepare all Sand Base, and material as applicable prior to forming footings and trenches.
2. Remove all water from excavation. Divert flow of water through drains using methods to avoid washing over freshly deposited concrete.
3. Remove hardened concrete, wood chips, shavings and other debris from interior of forms and from reinforcing steel by vacuum process.
 - a. No wooden ties or blocking shall be left in concrete except where indicated for attachment of other work.
4. Forms shall have been erected, adequately braced, cleaned, sealed, lubricated if required, and bulkheaded where placing is to stop.

5. Any wood forms other than plywood shall be thoroughly water soaked before placing any concrete.
 - a. The wetting of forms shall be started at least 12 hours before concreting.
6. Reinforcing steel shall have been placed, tied and supported.
7. Coordinate with Specification Section - SOIL TREATMENT before placing any concrete.
8. Embedded work of all trades shall be in place in the forms and adequately tied and braced.
9. Reinforcing steel, at the time the concrete is placed around it, shall be cleaned of scale, mill scale or other contaminants that will destroy or reduce bond.
10. Concrete surfaces to which fresh concrete is to be bonded shall be brush cleaned to remove all dust and foreign matter and to expose the aggregate, and then coated with the bonding adhesive herein specified.
11. Prior to placing concrete for any slabs on grade, the moisture content of the subgrade below the slabs shall be adjusted to at least optimum moisture.
12. No concrete shall be placed until formwork, reinforcement, and embedded items have been approved by the Architect.
 - a. Clean forms of all debris and remove standing water.
 - b. Thoroughly clean reinforcement and all handling equipment for mixing and transporting concrete.
 - c. Concrete shall not be placed against reinforcing steel that is hot to the touch.
13. Provide runways or other approved means for wheeled equipment. Do not wheel equipment over reinforcing or formwork.

3.3 INSTALLATION

A. Placing of Rock Base, and Sand Base.:

1. Rock Base:
 - a. Shall occur after scarification and compaction operations.
 - b. Preparation of sub-grade and selection and placing of Rock Base subject to continuous inspection and supervision of Geotechnical Engineer.
 - c. Compact Rock Base to a density of not less than ninety-two (92) percent, but not more than ninety-five (95) percent, in accordance with Test Designation ASTM D 1557 "Test methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lb./sq.ft.)."
 - 1) Density of each layer of Rock Base shall be tested and verified that it meets required density of Geotechnical Engineer prior to placing any other succeeding layers.
 - d. Roll Rock Base under interior (and any designated exterior slabs) to smooth surface, free of large or sharp particles.
 - e. Conduct work to minimize inspection costs.
 - f. Costs of initial compaction tests shall be borne by the Owner.
 - 1) Contractor shall pay for all re-tests required due to failure of initial tests.
2. Sand base:
 - a. Shall occur after scarification and compaction operations.
 - b. Preparation of any sub-grade Engineered Fill, Rock Base sub-bases, placing of Vapor Retarder, and placing of Sand Base subject to continuous inspection and supervision of Geotechnical Engineer.

- c. Compact Sand Base to a density of not less than ninety-two (92) percent, but not more than ninety-five (95) percent, in accordance with Test Designation ASTM D 1557 "Test method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/sq.ft.)."
 - 1) Density of each layer of Sand Base shall be tested and verified that it meets required density of Geotechnical Engineer prior to placing any succeeding layers.
 - d. Roll Sand Base under interior (and any designated exterior slabs) to smooth surface, free of large or sharp particles.
 - e. Conduct work to minimize inspection costs.
 - f. Costs of initial compaction tests shall be borne by the Owner. Contractor shall pay for all re-tests required due to failure of initial tests.
3. Vapor Retarder:
- B. Joints:
- 1. General: Construct joints straight, horizontal, true with faces perpendicular to surface plane of concrete and free of "overhangs" or "lips" to line.
 - 2. Construction Joints:
 - a. Location: as indicated or as approved by Architect.
 - 1) Install as to least impair strength of structure, appearance of concrete and shall conform to typical details and in accordance with ACI Standards.
 - a) Joints between concrete and masonry shall be considered construction joints.
 - b. Spacing: Pour lengths shall be as follows, unless specifically noted otherwise.
 - 1) Foundations: 100 feet maximum
 - 2) Walls: 60 feet maximum
 - 3) Structural Slabs: 60 feet o.c. maximum
 - 4) Interior Slabs on grade: 30 feet o.c. maximum
 - 5) Exterior Slabs on grade: 30 feet o.c. maximum
 - c. Installation:
 - 1) Construction joints shall have level tops, vertical sides.
 - 2) Construction joints shall be thoroughly cleaned and roughened by removing entire surface film and exposing clean aggregate solidly embedded in mortar matrix.
 - 3) See drawings for doweling and required keys.
 - 4) Roughen construction joints by any of the following methods:
 - a) By sandblasting joint.
 - b) By thoroughly washing joint, using a high pressure hose, after concrete has taken initial set. Washing shall be done not less than 2 hours nor more than 4 hours after concrete has been poured, depending upon setting time.
 - c) By chipping and wire brushing.
 - d) Vertical construction joints need not be roughened
 - 5) All decisions pertaining to adequacy of construction joint surfaces and to compliance with requirements pertaining to construction joints shall be reviewed with the Architect.
 - 6) Just before starting new pour, horizontal and vertical joint surfaces shall be dampened (but not saturated).

- 7) Before placing regular concrete mix, horizontal and vertical joint surfaces shall be covered with a layer of mortar composed of cement and fine aggregate of same proportions as that used in prescribed mix, but omitting coarse aggregate.
3. Expansion Joints:
 - a. Location: as indicated or as approved by Architect.
 - 1) Exterior slabs on grade: locate at walks, curbs, gutters, etc.
 - a) Locate at each side of structure/vertical surface, curb transition opposite apron joints, end of curb returns, and back of curb when adjacent to walk.
 - 2) Interior slabs on grade: Install at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - b. Spacing:
 - 1) Exterior Slabs on grade: 30 feet o.c. maximum, unless otherwise noted.
 - 2) Interior Slabs on grade: as indicated.
 - c. Installation:
 - 1) Install Expansion Filler in expansion joints.
 - a) Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless noted otherwise.
 - b) Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface.
 - c) Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
 - d) "Glue" Expansion Filler to edge of previous pour.
 - 2) When concrete has taken initial set, the edge of concrete surface shall be rounded by tooling to top of Expansion Filler.
 - 3) Interrupt reinforcing at all expansion joints.
 - a) Refer to Drawings for detail.
 4. Control Joints (Contraction Joints):
 - a. Location: as indicated or as approved by Architect.
 - 1) Construction and expansion joints shall be considered as control joints.
 - b. Spacing:
 - 1) Exterior Slab on grade: 10 feet o.c. maximum, unless otherwise noted.
 - 2) Interior Slab on grade: 15 feet o.c. maximum.
 - a) Maximum area not to exceed 225 sf.
 - b) Maximum length to width not to exceed 1 to 1 1/2 ratio.
 - c) Conform to bay spacing wherever possible (at column centerlines, half bays, third bays, etc).
 - c. Installation: Form weakened-plane control joints, sectioning concrete into areas as indicated.
 - 1) Use saw cuts 1/8 inch wide by 1/4 of slab depth, or tooled joints with rounded edges 1/8 inch wide by 1/4 of slab depth, unless specifically noted otherwise.
 - 2) Control joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing without dislodging aggregate and with no spalling of edges on either side of the joint.
 - 3) Slab reinforcing need not be terminated at control joints.

C. Placing of Concrete - General:

1. All concrete shall be placed under direct observation of the Owner's Inspector.

2. Notify Owner's Inspector not less than forty-eight (48) hours prior to pouring of first concrete.
3. Place concrete in accordance with ACI 304.3R "Heavyweight Concrete Measuring, Mixing, Transporting, and Placing."
4. Do not place Concrete outside of regular working hours except to complete work already started.
5. Do not use Concrete which has been mixed for a period longer than one and one-half (1-1/2) hours or which has started to stiffen or set.
6. Re-mixing on concrete, which has started to set, shall not be permitted.
7. Pouring of concrete shall be a continuous operation until the completion of the Section or Panel in accordance with ACI 304.3R "Heavyweight Concrete Measuring, Mixing, Transporting, and Placing."
8. Consolidation:
 - a. Concrete shall be thoroughly compacted and worked to all points with solid continuous contact to forms and reinforcement to eliminate air pockets and honeycombing.
 - b. Power vibrators shall be used immediately following pour.
 - c. Spading by hand, hammering of forms or other combination of methods will be allowed only where permitted by Architect.
 - d. In no case shall vibrators be placed against reinforcing steel or used for extensive shifting of deposited fresh concrete.
 - e. Provide and maintain standby vibrators, ready for immediate use.
9. Keep a record of times, dates and locations of all concrete placing operations for the duration of the project. Record shall be available to Architect and Owner's Inspector at all times.
10. In no case shall concrete be poured into an accumulation of water ahead of pour.
11. If any concrete operation, once planned, can not be completed in a continuous operation, placement shall stop at temporary bulkheads located where resulting construction joints will least impair the strength of the structure. The location of construction joints shall be as shown on the drawings, or as approved by Architect.
12. Hot Weather Concreting: Unless otherwise directed by the Architect, perform all work in accordance with ACI 305.1 "Specification for Hot Weather Concreting" when air temperature rises above 75 degrees F and the following:
 - a. Mixing Water: Keep water temperature as low as necessary to provide for the required concrete temperature at time of placing. Ice may be required to provide for the design temperature.
 - b. Aggregate: Keep aggregate piles continuously moist by sprinkling with water.
 - c. Temperature of Concrete: The temperature of the concrete mix at the time it is being placed in the forms shall not exceed 85 degrees F.
 - 1) The method employed to provide this temperature shall in no way alter or endanger the design mix or the design strength required.
 - 2) Dampen subgrade and formwork before placing concrete.
 - 3) Remove all excess water before placing concrete.
 - 4) Keep concrete continuously wet when air temperature exceeds 85 degrees F for a minimum of 48 hours after placing concrete.
 - d. Protection: Minimize evaporation from concrete in place by providing shade and windbreaks. Maintain such protection for 14 days minimum.
13. Cold Weather Concreting: Follow recommended ACI 306R "Cold Weather Concreting" procedures when air temperature falls below 40 degrees F, as approved by Architect.
 - a. Concrete placed in freezing temperature shall have a temperature of not less than 50 degrees F.
 - b. Maintain this temperature for at least 7 days.

- c. No chemicals or salts shall be used to prevent freezing and no accelerating agents shall be used without prior approval from Architect.
14. Concrete shall not be placed if sand overlying the vapor retarder barrier has been allowed to attain a moisture content greater than 5 percent due to precipitation or excessive watering.
- D. Placing of Concrete at Footings, Walls, Columns, etc.:
1. Concrete shall be placed in layers not to exceed twenty-four (24) inches in depth, and shall be thoroughly compacted.
 - a. Wait forty minutes before placing next layer.
 - b. Re-vibrate six (6) inches into previous lift before next lift is added.
 - c. Locate top of lift at or below top of wall opening.
 2. Use openings in forms, elephant trunks or other approved methods to prevent accumulation of concrete on forms and reinforcement above the level of pour.
 - a. Unconfined free falls shall not exceed five (5) feet.
 3. Where placing or consolidation is restricted by close assemblage of reinforcing and/or forms use a Modified Mix Concrete with smaller aggregate and/or pour 3 inches of neat grout into form prior to regular mix.
 4. Concrete shall not be flowed horizontally along forms.
- E. Placing of concrete at slab on grade:
1. Slabs on grade shall not be poured until the sub-grade has been thoroughly compacted and properly prepared, complete with vapor retarder or barrier, nor until reinforcement and inserts are securely fastened in place.
 - a. Sub-grade above and below vapor retarder where installed resilient flooring products or rubber/vinyl-backed products are proposed to be installed shall not be moistened prior to pouring concrete.
 2. No greater area shall be poured at one time than can be properly finished without checking.
 3. Slabs on grade shall be laid out in a checkerboard pattern when applicable. Pour and allow alternate slabs to set.
 - a. Fill out balance of checkerboard pattern with subsequent pour.
 4. Concrete shall be poured as dry as possible, consistent with good workmanship.
 - a. Water shall not be added to mix to improve workability without approval of the Architect.
 5. Concrete shall be compacted by hand tamping and by mechanical vibration.
 - a. After the concrete is thoroughly compacted, the surface shall be screeded off, any surface water removed and finish applied as specified.
 6. The Contractor may, on approval of DSA and the Architect, use a Finish Enhancing Admixture (High Range Water Reducer) in accordance with Article Titled MATERIALS.
- F. Placing of concrete by pumps:
1. If pumps are used to place concrete, the fines (3/8" and smaller) shall not exceed 45 percent of the total volume of aggregate. Standby equipment must be provided to insure completing pours to planned cutoffs.
 2. Pumps shall handle concrete at a uniform rate without bleeding or segregation of aggregates. Concrete from end of the hose shall have a free fall not to exceed four (4) feet. Aluminum pipe shall not be used to transport pumped concrete.

- G. Installation of nonshrink grout or drypack: Install under base plates immediately after erection of structural steel.
1. General: Ram in thin layers, using a short length of ram, the free end of which shall be struck with a heavy hammer or mallet, several blows for each layer, to compact the mixture. When completed, the exposed drypack shall show slight indication of moisture.
 2. Curing: Cure with a curing compound or with moisture-retaining barrier kept wet.

3.4 APPLICATION

A. Finishes application:

1. Screed, consolidate, and level concrete slabs prior to any Finishes.
2. Tooled Finishes:
 - a. Scratch finish:
 - 1) After screeding, consolidating, and leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
 - b. Float finish:
 - 1) After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating.
 - 2) Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both.
 - 3) Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power units.
 - 4) Finish surfaces to tolerances indicated.
 - 5) Cut down high spots and fill low spots.
 - 6) Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
 - c. Trowel finish:
 - 1) After floating, begin first trowel-finish operation using a power-driven trowel.
 - a) Begin final troweling when surface produces a ringing sound as trowel is moved over surface.
 - b) Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances indicated.
 - c) Grind smooth any surface defects that would telegraph through applied floor covering system.
 - 2) Where thin set ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.
 - d. Broom finish:
 - 1) Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route for the indicated broom finish.
 - 2) Medium Broom Finish: On all surfaces having a pitch of less than 6 percent.
 - 3) Rough Broom Finish: On all surfaces having a pitch of more than 6 percent.
3. Applied Finishes:

- a. Slab Curing Compound Finish (SCC):
 - 1) Apply Clear Slab Curing Compound Sealer Finish in accordance with manufacturer's written recommendations, and in exterior areas only as indicated by the Contract Documents.
 - b. Clear Floor Sealer Finish (CFS):
 - 1) Apply Clear Floor Sealer Finish in accordance with manufacturer's written recommendations, and in areas as indicated by the Contract Documents.
4. Repair Finishes:
- a. Sack Finish: Use only enough water as required for handling and placing.
 - 1) Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than one (1) inch.
 - a) Make edges of cuts perpendicular to the concrete surface.
 - b) Thoroughly clean, dampen with water, and brush-coat the area to be patched with a bonding agent.
 - c) Place patching mortar before bonding agent has dried.
 - 2) For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color.
 - a) Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching.
 - b) Compact mortar in place and strike-off slightly higher than surrounding surface.
- B. Concrete curing and protection:
1. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
 - a. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material.
 - b. Apply according to manufacturer's written instructions after screeding and bull floating, but before power floating and troweling.
 2. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than ten (10) days.
 3. Formed Surfaces:
 - a. Wet forms immediately after pouring.
 - b. Keep forms and exposed surfaces wet until forms are removed.
 - c. Keep all surfaces wet after forms are removed for ten (10) days after placement of Concrete.
 4. Concrete Slab Curing Methods:
 - a. One spray coat of clear curing compound.
 - 1) Agitate curing compounds thoroughly by Mechanical means continuously during use and spray or brush uniformly in accordance with manufacturer's written recommendations.
 - 2) Not applicable for:
 - a) Slabs designated for Adhesively Applied Floor Coverings.
 - b) Slabs designated for Ceramic Carpet on top of concrete slab.
 - c) Slabs designated for Polished Concrete Finishing.
 - b. Curing paper:
 - 1) Anchor the paper or film securely and seal all edges in such a manner as to prevent moisture escaping from concrete.

- 2) Protect all exposed surfaces with "Curing Paper." Curing Paper shall be kept moist.
- 3) Contractor shall be responsible for protection of finished concrete against injury by rain, cold, vibration, animal tracks, marking by visitors, vandalism, etc.
- 4) Required for the following:
 - a) All interior concrete slabs, except at Pool Mechanical Building.

3.5 CONSTRUCTION

A. Site Tolerances:

1. Exterior Site Improvements:
 - a. Placement of all concrete shall not exceed 0.02 feet variance from designated grades.
 - b. Surface variation of all concrete slabs shall not exceed 0.01 foot in 10 feet.
 - c. Construction of all concrete subject to ADA access compliance, including Accessible Path of Travel, curb returns, parking stalls and unloading areas, barrier free amenities and / or other applicable site improvements shall conform to the Americans with Disabilities Act, California Title 24 and the California Building Code, regardless of any construction tolerances. Examples of minimum and maximum limits related to ADA access compliance include, but are not limited to:
 - 1) Accessible Path of Travel cross-slope shall not exceed 2 percent.
 - 2) Accessible Path of Travel longitudinal slopes shall not exceed 5 percent.
 - 3) Ramp longitudinal slopes shall not exceed 8.33 percent.
 - 4) Walks shall not have less than 48 inches in unobstructed width.
 - d. Contractor shall maintain all grades and slopes through out construction and until Notice of Completion has been filed.
2. Building Slabs:
 - a. Additional Installation Tolerances:
 - 1) FF (Floor Flatness) and FL (Floor Levelness): The Contractor shall measure according to ASTM E 1155 "Standard test method for Determining FF (Floor Flatness) and FL (Floor Levelness) Numbers," within twenty-four (24) hours of the pour.
 - a) Cut down high spots, and fill low spots, and adjust pour techniques to achieve floor tolerances specified.
 - b) Contractor shall pay for and have a Certified Report in writing from an Independent Testing Agency that concrete substrates requiring FF and FL only are constructed to the specified tolerances, and are ready for floor coverings that require FF and FL.
 - c) SOV = Specified Overall Value.
 - d) MLV = Minimum Local Value.
 - e) Required tolerances of concrete surface substrates for specific flooring systems:
 - f) Polished Concrete: Refer to Specification Section - POLISHED CONCRETE FINISHING.
 - b. Typical Building Slabs:
 - 1) Flatness: SOV, greater than FF 35, MLV, greater than FF 24.
 - 2) Levelness: SOV, greater than FL 25, MLV, greater than FL 17.
 - c. Polished Concrete Flooring Slabs:
 - 1) Flatness: SOV,; greater than FF 45, MLV,; greater than FF 30.
 - 2) Levelness: SOV,; greater than FL 35, MLV,; greater than FL 24.

3.6 REPAIR/RESTORATION

A. Minor Defects:

1. Minor defects in concrete shall mean any of the following:
 - a. Pour joints, voids, rock pockets, tie holes, etc. where strength, and durability is not adversely affected.
 - b. Shrinkage Cracks where slabs are not exposed or where appearance is not important
 - c. Minor defects of pour joints, voids, rock pockets, tie holes, etc.
 - d. Immediately after removing forms, inspect all concrete surfaces. Patch any pour joints, voids, rock pockets, tie holes, etc., as soon as possible, but not until the defect has been examined by the Architect.
 - e. Chip away defective areas to a minimum depth of one inch, with edges perpendicular to surface. Clean area to be patched of all laitance.
 - f. Coat area to be patched with Bonding Agent. Patch with Mortar mixed with Bonding Agent thoroughly compacted into place and screeded off to leave the patch slightly higher than the surrounding surface. After at least one hour finish patch to match the adjoining surface. Cure patch by application of curing compound or by wetting for seven (7) days.
 - g. Fill tie holes solid with mortar after cleaning and thoroughly wetting. Fill through holes by means of a plunger-type grease gun. See Specification Section - CONCRETE FORMWORK, Part 3 Article titled "INSTALLATION," and the paragraph titled "Indentations" for exception.
 - h. Remove fins and rough surfaces from all exposed concrete.
2. Minor defect of shrinkage cracks:
 - a. After entire slab is finished and fully cured, shrinkage cracks larger than 1/32 inch wide shall be filled with cement grout and struck off level with surface.

B. Serious Defects:

1. Serious defects in concrete shall mean any of the following:
 - a. Concrete not meeting 100 percent of the specified 28 day compressive strength.
 - b. Concrete exhibiting rock pockets, voids, spalls, streaks, cracks, exposed reinforcing to extent that strength, durability, or appearance is adversely affected.
 - c. Concrete significantly out of place, line or level.
 - d. Concrete not containing the required embedded items.
 - e. Shrinkage Cracks where slabs are exposed and appearance is important.
 - f. Concrete where patching does not satisfactorily restore quality and appearance of surface.
2. Upon determination that concrete strength is defective:
 - a. Should cylinder tests fall below minimum strength specified, concrete mix for remainder of work shall be adjusted to produce required strength. Core samples shall be taken and tested from cast-in-place concrete where cylinders and samples indicate inferior concrete with less than minimum specified strength.
 - b. Cores of hardened concrete shall be taken and tested in accordance with ASTM C 39 "Test method for Compressive Strength of Cylindrical Concrete Specimens" and ASTM C 42 "Test method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete." Number and location of such cores shall be subject to the approval of Architect.
 - c. Cost of core sampling and testing will be paid for by the Contractor.

- d. "500 psi" and "85 percent" reduction in ACI 318 "Building Code requirements for Structural Concrete and Commentary," Section 26.12.4 will not justify low cylinder tests.
 - e. If core tests indicate that concrete is below the strength specified, the concrete shall be deemed defective, and shall be removed and replaced without additional cost to the Owner.
3. Major defect of shrinkage cracks.
 - a. After entire slab is finished and fully cured, unsightly shrinkage cracks shall be repaired in a manner satisfactory in appearance to the Architect. If this cannot be accomplished, concrete shall be considered defective.
 4. Upon determining that concrete surface is defective:
 - a. Contractor may restore concrete to acceptable condition by cutting, chipping, pointing, patching, grinding, if this can be done without significantly altering strength of structure.
 - b. Permission to patch defective areas will not be considered a waiver of the right to require removal if patching does not, in the opinion of the Architect, satisfactorily restore quality and appearance.
 - c. If patching does not restore concrete to specified quality and appearance, the concrete shall be deemed defective, and shall be removed and replaced without additional cost to the Owner.
 - d. No repair work shall begin until concrete has been examined and procedures have been reviewed by the Architect and Structural Engineer and approved by DSA.
 5. Repair defects by complete removal of concrete and replacement or repair defects with Shotcrete in accordance with CBC Sections 1908A, strength to match mix design and material being repaired.
 6. Place and cure Shotcrete in accordance with CBC Section 1908A.
 7. Inspect and test Shotcrete as per CBC Section 1908A.10.
- C. Cost of repairing shall be borne by the Contractor.

3.7 FIELD QUALITY CONTROL

- A. Contractor's Field Quality Control:
1. Contractor shall protect slabs receiving flooring products from excess moisture after the curing process, removing excess moisture after rains, broken water pipes, etc., to ensure that the monolithic slabs are dry enough for application of flooring products. When all spaces have been enclosed, acclimate the building as soon as possible with the building's own mechanical heating and cooling system, and other outside devices as required to properly prepare the monolithic slabs for flooring installation.
 - a. The test sites for the RH Tests shall be at the same room temperature and humidity expected during normal use. If this is not possible, then the test site conditions should be 75 degrees F (plus or minus 10 degrees F) and 50 percent relative humidity (plus or minus 10 percent relative humidity) 48 hours prior to, and during testing.
 2. Contractor shall maintain temperature and humidity in a manner not deleterious to the flooring materials installed until the Owner assumes occupancy.
- B. Inspection:
1. Project Inspector shall inspect placement of concrete and grout.
- C. Manufacturer's Field Services:

1. Contractor shall notify Vapor Retarder manufacturer at least one week prior to the Pre-Construction Conference regarding the Vapor Retarder installation, and will schedule subsequent visits at the appropriate times with at least one week's notice to ensure proper installation of the Vapor Retarder in accordance with the Manufacturer's Written Instructions.
2. Manufacturer shall provide and written Inspection and installation certification to the Architect that full compliance with the manufacturer's written instructions were followed and adhered to prior to covering with concrete.

3.8 CLEANING

- A. The top of all concrete foundations receiving concrete masonry units shall be washed free of all laitance and loose concrete, and roughened to a roughness amplitude of 1/4".
- B. Remove all debris, excess materials, tools, and equipment resulting from or used in this operation at completion of work.

END OF SECTION

SECTION 033500 – POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely provide polished concrete finishing materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 11 01 CONCRETE FORMWORK
 - 4. 03 30 00 CAST-IN-PLACE CONCRETE
 - 5. 07 92 00 SEALANTS
 - 6. 09 65 10 RESILIENT BASE AND ACCESSORIES
 - 7. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 8. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. Standards:
 - 1. In accordance with the following standards:
 - a. ACI American Concrete Institute.
 - 1) ACI 302.1R "Guide for Concrete Floor and Slab Construction."
 - b. ASTM American Society of Testing Materials.
 - c. NFSI National Floor Safety Institute.
 - 1) NFSI Test Method 101-A "Standard for Evaluating High-Traction Flooring Materials, Coatings, and Finishes."
 - d. RILEM Reunion Internationale des Laboratoires D'Essais et de Recherches sur les Materiaux et les Consructions.
 - 1) RILEM Test Method 11.4 "Standard Measurement of Reduction of Moisture Penetration Through Horizontal Concrete Surfaces."

1.3 DEFINITIONS

- A. New Concrete: Concrete poured as part of this Project. Refer to Specification Section - CAST-IN-PLACE CONCRETE.

1.4 SYSTEM DESCRIPTION

- A. Performance Requirements: It is the intention of this section and the drawings to form a guide for a complete system. Any items not specifically noted but necessary for a complete system shall be provided under this section.
1. Fire Rating: Class "A" Fire Rated when tested in accordance with ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials."
 2. Abrasion Resistance:
 - a. ASTM C 779 "Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces," Method A, high resistance, no more than 0.008 inch (0.20 mm) wear in 30 minutes.
 3. Reflectivity: Increase of 35 percent as determined by standard gloss meter.
 - a. ASTM E 430, "Standard Test Methods for measurement of Gloss or High-Gloss Surfaces by Abridged Goniophotometry."
 4. Waterproof Properties: RILEM Test Method 11.4, 70 percent or greater reduction in absorption.
 5. High Traction Rating after Polishing: NFSI 101-A, non-slip properties.
 - a. Static Coefficient of Friction: For Polished Concrete Floors, all walkway surfaces shall comply with the ADA Requirements and the following minimum values as determined by testing identical products per ASTM C 1028 "Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method:"
 - 1) Level Surfaces: Minimum 0.6.
 - 2) Ramps: Minimum 0.8.
- B. Design Requirements:
1. Verify Hardened Concrete Properties:
 - a. Minimum new concrete compressive strength Minimum 3,500 psi required.
 - b. Floor slab to be polished is Normal Weight Concrete.
 - 1) That no Lightweight Aggregate Concrete is used in the mix.
 - 2) That no Air Entrained Concrete Admixture is used in the mix.
 2. Verify Placement Properties:
 - a. That the natural concrete slump of concrete mix was between 4-1/2 inches – 5 inches.
 - b. Flatness and Levelness Requirements in accordance with ASTM E 1155 "Standard test method for Determining FF (Floor Flatness) and FL (Floor Levelness) Numbers:"
 - 1) Flatness: SOV, greater than FF 45, MLV, greater than FF 30.
 - 2) Levelness: SOV, greater than FL 35, MLV, greater than FL 24.
 3. Verify that the finish of the concrete slab was accomplished with Hard-Steel Trowels, and that the minimum passes for the slab was at least three (3) passes, and that there were no burn marks.
 - a. Finish shall comply with ACI 302.1R, Class 5 Floor.
 4. Verify that the Curing Options used for the floor slab were at least one of the following:
 - a. Sheet membrane (ASTM C 171 "Specification for Sheet materials for Curing Concrete").
 - 1) Polyethylene Film is NOT ALLOWED.
 - b. Damp Curing Process:

- 1) Seven Day Cure minimum.
5. Verify that no Spray-On "Cure and Seal" curing compounds were used.

1.5 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

1. Product Data.
 - a. Submit product data for specified products.
 - b. Material Safety Data Sheets (MSDS).
 - c. Joint and Crack filler color range for selection by the Architect.
2. Shop Drawings.
 - a. Typical layout showing the colored concrete treatment areas per color choice.
 - b. Typical layout including dimensions and floor grinding schedule.
 - c. Plan view of floor and joint pattern layout.
3. Quality Assurance/Control Submittals:
 - a. Test Reports:
 - 1) Submit three (3) copies of reports.
 - a) Certified test reports showing compliance with specified performance characteristics and physical properties as cited in Design Requirements article.
 - b) Manufacturers Field Reports indicating that the manufacturer has read and instructed the installer of the proper procedures in regards to the Manufacturer's installation instructions prior to the start of the Polishing Operations.
 - c) Manufacturers Field Reports indicating Installers compliance with Manufacturer's Installation Instructions at the end of the Polishing Operations.
 - b. Certificates:
 - 1) Submit three (3) copies of certificates.
 - a) Product certificates signed by manufacturer certifying materials comply with specified performance characteristics, criteria, and physical requirements.
 - b) Letter of certification from the National Floor Safety Institute confirming the system has been tested and passed phase Two Level of certification when tested by Method 101-A.
 - c) Current contractor's certificate signed by manufacturer declaring contractor as an approved installer of polishing system.
 - c. Manufacturer's Written Instructions:
 - 1) Submit three (3) copies of manufacturer's written procedural instructions.
4. Closeout Submittals in accordance with the following:
 - a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - b. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
 - c. Warranty in accordance with Specification Section - WARRANTIES.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications:
 - a. Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
 - b. Installer trained and holding current manufacturer's certification for Polished Concrete Finish installation.
 - 1) Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions and data sheets.
 - 2) Use only manufacturer certified Polished Concrete Finishing installers.
 - 3) Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 2. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
- B. Regulatory Requirements:**
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
- C. Mockups:**
1. Mock-Up Size: One 100 ft² sample panel at jobsite at location as directed under conditions similar to those which will exist during actual placement.
 - a. Mockups shall be located in a space that is not visible to the public, such as ancillary spaces, maintenance rooms, mechanical rooms, or rooms that will receive carpet. Refer to Finish Schedule.
 - b. Mockup grinding grades GGL II thru III for each color and finish for the Architect to select.
 - c. Show:
 - 1) Several intensities of colors for selection by Architect. More intense dye concentrations may be required to achieve color.
 - 2) Colors immediately adjacent to show workmanship in control of pattern.
 - 3) Partial sample of graphic at 100% scale.
 - 4) Partial sample of pattern: filled joints, colored, scored.
 2. Allow 24 hours for inspection of mock-up before proceeding with work.
 3. Mock-up will be used to judge workmanship, concrete substrate preparation, operation of equipment, material application, polished concrete shine, color, and proposed protection methods during construction.
 4. Remove mock-up and dispose of materials when no longer required and when directed by the Architect.
- D. Meetings:**
1. New Concrete: Schedule prior to the concrete pour.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements, such as:

- 1) Environmental requirements.
 - 2) Concrete mix requirements.
 - 3) Concrete curing requirements.
 - 4) Concrete protection requirements.
2. Pre-Installation: Schedule prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements, such as:
 - 1) Environmental requirements.
 - 2) Scheduling and phasing of work.
 - 3) Coordinating with other work and personnel.
 - 4) Protection of adjacent surfaces.
 - 5) Surface preparation.
 - 6) Repair of defects and defective work prior to installation.
 - 7) Cleaning.
 - 8) Application of liquid hardener, densifier.
 - 9) Installation of polished floor finishes.
 - 10) Protection of finished surfaces after installation.
3. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
 4. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems, which may impede issuance of warranties or guaranties.
 - b. Maintaining installed work until the Final Inspection by the Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 1. Products shall be handled in such a manner as to assure that they are free from damage.
 2. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
 3. Delivery:
 - a. Deliver materials in manufacturer's original packaging with identification labels and seals intact.
- B. Acceptance at Site:
 1. Damaged products will not be accepted.
 2. Products must be in manufacturer's original unopened containers with labels indicating brand name, product number, and grade.
- C. Storage and protection:
 1. Storage and Protection:
 - a. Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 - 1) Store under cover in a cool place with temperatures between 40 and 90 degrees F. Protect from freezing. Don't stack packages or buckets more than three high.

- b. Protect concrete slab prior to polishing:
 - 1) Protect from petroleum stains during construction.
 - 2) Diaper hydraulic power equipment.
 - 3) Restrict vehicular parking.
 - 4) Restrict use of pipe cutting machinery.
 - 5) Restrict placement of reinforcing steel on slab.
 - 6) Restrict use of acids or acidic detergents on slab.
 - 7) Restrict use of adhesives on slab.
- 2. Waste Management and Disposal:
 - a. Remove from site and legally dispose of packaging materials.

1.8 PROJECT CONDITIONS

- A. Environmental requirements:
 - 1. Dust control: Perform work in a manner as to minimize the spread of dust and flying particles.
 - 2. Rain: The work under this section shall not be started or maintained under threat of rain unless the work is not affected by the rain.
 - 3. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting topping performance.
 - 4. Temporary Lighting: Provide a minimum 200W light source, placed 8 feet above floor surface, for each 425 sq ft of floor being finished.
 - 5. Ventilation: Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with manufacturer's instructions.
 - 6. Verify that the concrete surface meets the Design Requirements within this specification.
- B. Existing Conditions:
 - 1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.9 SEQUENCING AND SCHEDULING

- A. Sequence with Other Work: Comply with manufacturer's written recommendations for sequencing construction operations. It is imperative that this work be done before any framing is in place upon the slab, otherwise the consistency of the finish would be compromised if done at a later date within the construction operations.
 - 1. Grinding:
 - a. Identify the areas of existing or new slab construction, and coordinate the Grinding Grade Level required for each area.
 - 2. Polishing:
 - a. Provide manufacturer's written instructions before the polishing operations begin.

1.10 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period: One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section - WARRANTIES
 - a. Warranty Period: One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified Polishing Concrete Finishing product manufacturer:
 - a. L & M CONSTRUCTION CHEMICALS: "PermaShine System."
 - b. Acceptable alternative manufacturers:
 - 1) ADVANCED FLOOR PRODUCTS: "RetroPlate 99."
 - 2) DAYTON SUPERIOR: "Diamond Polish Floor Systems."
 - 3) DIAMATIC: "Ultraflor."
 - 4) THE BOMANITE CO.: "Manufacturer's Standard."
 - 5) PERFECT POLISH: "Natural Wonder Floor System."
 - 6) SCHOFIELD: "Formular One."
 - 7) W.R.MEADOWS: "Indurashine."
 - 2. Specified Hardener / Densifier product manufacturer:
 - a. L & M CONSTRUCTION CHEMICALS, INC.: "FGS Hardener Plus."
 - 1) Acceptable alternative product manufacturers:
 - a) THE BOMANITE CO.: "StabilizerPro."
 - b) THE BOMANITE CO.: "VitraFinish."
 - c) DYAMATIC: "Flor-Sil" Densifier and "Flor-Finish" Finish
 - d) W.R.MEADOWS: "Bellatrix" or "Liqui-Hard."
 - 3. Specified Joint Filler product manufacturer:
 - a. L & M CONSTRUCTION CHEMICALS, INC.: "Joint Tite 750."
 - 1) Acceptable alternative product manufacturers:
 - a) EUCLID: "Quick Joint 200."
 - 4. Specified Protective Cover product manufacturer:
 - a. RAM BOARD: "Ram Board."

- 1) Acceptable alternative product manufacturers:
 - a) McTECH GROUP: "EZcover."
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Products:
 1. Water shall be potable.
 2. Joint Filler: Semi-rigid, 2-component, self-leveling, 100% solids, rapid curing, polyurea control joint and crack filler with Shore A 80 or higher hardness.
 3. Hardener / Densifier: Water based, odorless liquid, VOC compliant, environmentally safe chemical hardening solution leaving no surface film.

2.3 FINISHES

- A. Gloss Reading Standards, in accordance with ASTM E 430, "Standard Test Methods for measurement of Gloss or High-Gloss Surfaces by Abridged Goniophotometry".
 1. GL-4 (Low Sheen) 400 grit.
 - a. Gloss Reading: 23-25.
 - b. Maximum Level of Slip Resistance (COF): 0.803.
 - c. Mohs Hardness Factor Range: 7.0.
- B. Verification of Performance:
 1. Ensure concrete finishing components and materials are from a single manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
 1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which, affect the execution of work under this specification section.
 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Coordination:
 1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
- B. Protection:

1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:

1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
3. Determine the Grind Grade level related to the depth of cut, indicating the amount of aggregate that is to be revealed during the initial grinding of the surface:
 - a. GGL-II - Grind Grade Level II (Salt and Pepper Finish):
 - 1) Exposing the fine aggregate such as sand and small aggregate within the substrate. Generally, this level of grind can be achieved within 1/16 inch of the surface.

3.3 INSTALLATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Provide planetary heads and orbiting machinery for a consistent and unburnished polishing effect.

B. Layout:

1. Lines shall be straight and true, except otherwise indicated.
2. In accordance with approved joints and floor pattern.

C. Assistance:

1. Application shall be in direct consultation and review of the manufacturer.

D. Floor Surface Polishing and Treatment:

1. Provide polished concrete floor treatment in entirety of slab indicated by drawings. Provide consistent finish in all contiguous areas.
2. Apply floor finish prior to installation of fixtures and accessories.
3. Apply Hardener / Sealer / Densifier as follows:
 - a. First coat at 250 ft²/gal. (or per manufacturer's written recommendations).
 - b. Second coat at 350 ft²/gal. (or per manufacturer's written recommendations).
 - c. Follow manufacturer's recommendations for drying time between successive coats.
4. "Diamond" grit-polish concrete floor surfaces with planetary/rotary power disc machine recommended by floor finish manufacturer. Sequence with coarse to fine diamond grit using dry method.
 - a. Comply with manufacturer's recommended diamond polishing grits for each sequence to achieve desired finish level. Level of sheen shall match that of approved mock-up.
 - b. Expose aggregate in concrete surface only as determined by approved mock-up.
 - c. All concrete surfaces shall be as uniform in appearance as possible.

5. Grind & polish perimeter and edges to match field. Hand tools and multiple passes may be required to achieve uniform finish. Visible change in finish from field finish will not be accepted.
6. Remove defects and re-polish defective areas.
7. Finish edges of floor finish adjoining other materials in a clean and sharp manner.

3.4 ADJUSTING

- A. Polish to higher gloss those areas not meeting specified gloss levels per mock-up.
- B. Fill joints greater than 1/8 inch deep flush to surface with color-matching material.
- C. Fill cracks greater than 1/8 inch deep flush to surface with color-matching material.

3.5 CLEANING

- A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
 1. Leave area free of debris.
 2. Clean any soiled surfaces immediately.
 3. Finish shall be clean and ready for the application of any additional finishes.
 4. In accordance with manufacturer's written instructions and recommendations.

3.6 PROTECTION

- A. Protection from traffic:
 1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 042200 – CONCRETE MASONRY UNITS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install all Concrete Masonry Unit (CMU) materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - a. Section includes liquid water-repellent admixture added to the concrete masonry units at the time of manufacture.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 03 11 01 CONCRETE FORMWORK
 4. 03 15 14 DRILLED ANCHORS
 5. 03 20 00 REINFORCEMENT
 6. 03 30 00 CAST-IN-PLACE CONCRETE
 7. 05 12 00 STEEL AND FABRICATIONS
 8. 05 30 00 METAL DECK
 9. 06 10 00 ROUGH CARPENTRY
 10. 06 41 23 MODULAR CASEWORK
 11. 07 14 16 FLUID-APPLIED WATERPROOFING
 12. 07 21 00 INSULATION
 13. 07 60 00 SHEET METAL
 14. 07 92 00 SEALANTS
 15. 08 16 13.01 FIBERGLASS DOORS AND FRAMES
 16. 08 33 00 COILING DOORS
 17. 09 22 16 METAL FRAMING
 18. 09 24 00 CEMENT PLASTER
 19. 09 29 00 GYPSUM BOARD
 20. 09 65 10 RESILIENT BASE AND ACCESSORIES
 21. 09 91 00 PAINTING
 22. 10 14 00 IDENTIFYING DEVICES
 23. 10 21 13 TOILET PARTITIONS
 24. 10 28 13 TOILET ACCESSORIES
 25. 10 44 00 FIRE PROTECTION SPECIALTIES
 26. 31 20 00 EARTHWORK
 27. 32 31 13 CHAIN LINK
 28. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 29. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. Standards:
1. In accordance with the following standards:
 - a. ACI American Concrete Institute

- b. ASTM American Society of Testing Materials
- c. CMACN Concrete Masonry Association of California and Nevada
- d. NCMA National Concrete Masonry Association
 - 1) TEK Bulletins
- e. TMS The Masonry Society

1.3 DEFINITIONS

- A. The following definitions occur within the CMU Industry:
 - 1. Grout: The filler within the Cells of the Concrete Masonry Units.
 - 2. Mortar: The joint material between the Concrete Masonry Units, both Top and Bottom and on the Ends.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 - 1. Product Data: For each type of product specified.
 - a. Manufacturer's standard color range for selection by the Architect.
 - b. All data regarding Concrete Masonry Unit, type, and aggregate to be provided.
 - c. All data regarding mortar and grout materials, and mix designs to be provided.
 - d. All data regarding accessories to be provided.
 - 2. Shop Drawings: For the following.
 - a. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - b. Reinforcing Steel: Detail bending and placement of concrete masonry unit reinforcing bars.
 - 3. Samples. For each type, texture and color selected.
 - a. Provide 4" x 4" x 1" nominal size Concrete Masonry samples for texture, color, finish and dimension provided on this project as examples of the major CMU Units for the project.
 - 1) Provide other chips for all others.
 - b. Pigmented Mortar: Make samples using the same sand and mortar ingredients to be used on this project.
 - 1) Label samples to indicate types and amount of pigments used.
 - 4. Quality Assurance/Control Submittals:
 - a. Test Reports:
 - 1) Concrete Masonry Units: Lineal Shrinkage and Compressive Strength per ASTM C 140 "Test Methods for Sampling and Testing Concrete Masonry Units and Related Units" and ASTM C 426 "Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units."
 - 2) Mortar and Grout: Grout Compressive Strength and Mortar Properties per ASTM C 270 "Specification for Mortar for Unit Masonry."
 - 3) Masonry Core test shall be in accordance with CBC Section 2105A.4.
 - b. Certificates:
 - 1) Concrete Masonry Unit Manufacturers Certification per ASTM C 90 "Specification for Loadbearing Concrete Masonry Units."
 - 2) Concrete Masonry Unit Accessory Material Suppliers Certification.
 - 3) CMU producer shall be certified by the manufacturer of integral CMU water repellent admixture.
 - 4) Installer Certification.
 - 5) Contractors Certification.
 - 5. Project Closeout Submittals:
 - a. Warranty.

- b. Project Record Documents: In accordance with Specification Section – PROJECT CLOSEOUT.

1.5 QUALITY ASSURANCE

A. Qualifications:

- 1. Material:
 - a. Manufacturers certification that Concrete Masonry Units furnished meet or exceed the requirements of this Specification Section per ASTM C 90 "Specification for Loadbearing Concrete Masonry Units".
- 2. Suppliers certification for all grout and mortar materials (including aggregate, cement and admixtures) that items furnished meet or exceed the requirements of this Specification Section and per ASTM C 270 "Specification for Mortar for Unit Masonry" • and ASTM C 476 "Specification for Grout for Masonry."
 - a. Water Permeance of Masonry: ASTM E 514, "Standard Test Method for Water Penetration and Leakage through Masonry."
 - b. Compressive Strength of Masonry Prisms: ASTM C 1314, "Standard Test Method for Constructing and Testing Masonry Prisms Used to Determine Compliance with Specified Compressive Strength of Masonry."
 - c. Drying Shrinkage of CMU: ASTM C 426, "Standard Test Method for Drying Shrinkage of Concrete Masonry Units."
- 3. Installer:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
- 4. Manufacturer/Supplier:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
 - b. Manufacturer belonging to the CMACN.

B. Regulatory Requirements:

- 1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Certificates:

- 1. Installer's certification that Concrete Masonry Units installation meets or exceeds the requirements of this Specification Section.
- 2. Contractor's certification that Concrete Masonry Unit materials and installation meets or exceeds the requirements of this Specification Section.

D. Mockups:

- 1. Provide a four (4) foot by six (6) foot mock-up wall showing all Concrete Masonry Unit finishes in conjunction with one another, and the mortar joints and tooling required for this Project. Mock-up, once approved, will be the basis for verifying the aesthetic and structural quality of the work for this Project. Protect during construction.

E. Meetings:

- 1. Pre-Installation: Schedule prior to the start of work.
 - a. Coordinate the work with other work being performed.

- b. Identify any potential problems, which may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
- c. Include discussions on the integral water-repellent CMU admixture and water-repellent mortars.
- 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress and properly tooled joints.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems, which may impede issuance of warranties or guaranties.
 - b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packing, Shipping, Handling, and Unloading:
 - 1. Products shall be handled in such a manner as to assure that they are free from spalls, breakage and other damage.
- B. Acceptance at Site:
 - 1. Products must be in manufacturer's original wrapped pallets with labels indicating brand name, model, and grade.
 - 2. Damaged products will not be accepted.
- C. Storage and Protection:
 - 1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation to prevent wetting prior to use.

1.7 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Rain: Work under this section shall not be started or maintained under threat of rain unless the work is protected from the rain.
 - 2. Temperature: Ambient temperature to install products shall be forty (40) degrees Fahrenheit and rising.
- B. Existing Conditions:
 - 1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
 - 2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.8 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section - WARRANTIES.

- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section - WARRANTIES
 - a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified Concrete Masonry Unit product manufacturer:
 - a. BASALITE.
 - 2. Specified Integral Water Repellent Admixture for CMU Production:
 - a. "Rheopel" as manufactured by BASF, or
 - b. "RainBloc" as manufactured by ACM CHEMISTRIES, or
 - c. "Dry-Bloc II" as manufactured by W. R. GRACE and CO.
 - 3. Specified Pre-Blended Water Repellent Admixture for Mortar:
 - a. "Rheopel Plus" as manufactured by BASF, or
 - b. "RainBlock" as manufactured by ACM CHEMISTRIES, or
 - c. "Dry-Bloc Integral Water Repellent" as manufactured by W. R. GRACE and CO.
 - 4. Specified Grout Admixture product manufacturer:
 - a. "Grout Aid" by SIKA.
 - 5. Specified Joint Reinforcement, Ties and Anchors product manufacturer:
 - a. HOHMANN AND BARNARD, INC.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Block:
 - 1. Hollow Load Bearing Units in accordance with CBC Section 2103A.1, and ASTM C 90 "Standard Specification for Loadbearing Concrete Masonry Units," (126 pcf of concrete or greater):
 - a. Primary Aggregate Lightweight Expanded Shale aggregate.
 - 1) The aggregate used for all Precision Faced Units not visible on the exterior or the interior, can be Pumice aggregate.
 - b. All exposed Concrete Masonry Units shall have integral color from manufacturer per material standard ASTM C 979 "Specification for Pigments for Integrally Colored Concrete."
 - 1) Including all colors to maximum dye content of 6 percent.

- c. Maximum lineal shrinkage from saturated to over dry condition of not more than 0.065 percent.
 - d. Twenty-eight day compressive strength of 2,000 psi on net area.
 - e. Integral CMU Water-Repellent:
 - 1) Integral liquid admixture mixed with concrete during production of CMUs.
 - 2) Water Permeance of Masonry: Capable of achieving a Class E Rating when evaluated using ASTM E 514 "Test Method for Water Penetration and Leakage Through Masonry."
 - f. Compressive Strength of Masonry Prisms: No statistically lower compressive strength of prisms shall occur as a result of adding integral water-repellent CMU and mortar admixtures when compared to a control (containing no admixtures) CMU and mortar when tested according to ASTM C 1314 "Test Method for Compressive Strength of Masonry Prisms."
 - g. Drying Shrinkage of CMU: No statistically higher drying shrinkage of the CMU shall occur as a result of adding integral water-repellent CMU admixture when compared to a control (containing no admixtures) CMU when tested according to ASTM C 426 "Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units."
- 2. Nominal Face Dimensions and Finishes: See drawings for locations of Concrete Masonry Unit types and sizes.
 - 3. CMU Color and Finish:
 - a. Interior Building Faces S-93(R) Precision Face, Light Weight.
 - b. Exterior Building Faces S-93(R) Ground Face, Light Weight.
 - c. Site Wall Faces S-93(R) Ground Face, Light Weight.
- B. Joint Reinforcement, Ties and Anchors:
- 1. General: Comply with requirements below for basic materials, as well as requirements for each form of joint reinforcement, tie, and anchor for size and other characteristics.
 - 2. Hot-Dip Galvanized Steel Wire: Uncoated wire in accordance with ASTM A 82 "Specification for Steel Wire, Plain, for Concrete Reinforcement," with zinc coating applied after prefabrication into units in accordance with ASTM A 123 "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products," 1.5 oz. per sq. ft. of wire surface.
 - 3. Joint Reinforcement: Welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet, with prefabricated corner and tee units.
 - a. Width: Approximately 2 inches less than nominal width of walls and partitions, providing mortar cover of not less than 5/8 inch on joint faces exposed to exterior and 1/2 inch elsewhere.
 - b. Wire Size, Side Rods: 10 gage, 0.15 inches.
 - c. Wire Size, Cross Rods: 9 gage, 0.15 inches.
 - d. Wire Size, Two-Piece Adjustable: 9 gage diameter in exterior walls.
 - e. Single-Wythe Configuration: Truss design, continuous diagonal cross rods spaced not more than 16 inches on center.
 - f. Truss type units with side rods spaced for embedment within each face shell of back-up wythe, ties extended to within 1 inch of exterior face of facing wythe.
 - g. Flexible Anchors: Masonry to Structural Framework: Two-piece anchors permitting vertical or horizontal differential movement between wall and framework parallel to, but resisting tension and compression forces perpendicular to, plane of wall.
 - 1) Anchorage to Steel Framework: Manufacturer's standard anchors with crimped 1/4 inch diameter wire anchor section for welding to steel 3/16", triangular-shaped wire tie section sized to extend within 1 inch of exterior face of facing wythe.

- h. Unit Type Masonry Inserts in Concrete: Cast iron or malleable iron inserts of type and size indicated.
 - i. Dovetail Slots: Dovetail slots with filler strips, of slot size as required; 22 gage sheet metal.
 - j. Anchor Bolts: Steel bolts with hex nuts and flat washers, complying with ASTM A 307 "Specification for Carbon Steel Bolts and Standards, 60,000 PSI Tensile Strength," Grade A, hot dip galvanized complying with ASTM A 153 "Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware • ," Class C; sizes and configurations indicated.
 - k. Reinforcing Bars: In accordance with Specification Section - REINFORCEMENT, deformed steel, per ASTM A 615 "Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement," Grade 60 for bars No. 3 to No. 18.
4. Miscellaneous Masonry Accessories:
- a. Non-Metallic Expansion Joint Strips: Premolded, flexible cellular neoprene rubber filler strips, complying with ASTM D 1056 "Specification for Flexible Cellular Materials – Sponge or Expanded Rubber," Grade RE41E1, capable of compression up to 35 percent; width and thickness as required.
 - b. Weepholes: Pre-manufactured weeps.
- C. Mortar and Grout:
- 1. In accordance with the following:
 - a. Cement: In accordance with ASTM C 150 "Standard Specification for Portland Cement," Type II.
 - b. Hydrated Lime: In accordance with ASTM C 207 "Standard Specification for Hydrated Lime for Masonry Purposes," Type S, unless otherwise noted.
 - c. Quicklime: In accordance with ASTM C 5 "Standard Specification for Quicklime for Structural Purposes."
 - d. Lime Putty: Made from hydrated lime or quicklime.
 - 1) If made from quicklime, other than processed pulverized quicklime, slake lime and then screen through a No. 16 mesh sieve. Before using, store and protect slaked and screened lime putty for not less than 10 days.
 - 2) Processed pulverized quicklime shall be slaked for not less than 48 hours, and shall be cool when used.
 - 3) Lime putty prepared from hydrated lime may be used immediately after mixing.
 - 4) Lime putty prepared from quicklime or pulverized quicklime shall have a plasticity figure, after slaking and screening, or not less than 200, and shall weigh not less than 83 lbs. per cubic foot. Lime putty prepared from hydrated lime shall conform to ASTM C 207 "Standard Specification for Hydrated Lime for Masonry Purposes," Type S.
 - e. Mortar Sand: In accordance with ASTM C 144 "Standard Specification for Aggregate for Masonry Mortar."
 - f. Modified Mortar Sand:
 - 1) In accordance with ASTM C 144 "Standard Specification for Aggregate for Masonry Mortar" modified to not less than 3 percent shall pass the No. 100 sieve.
 - g. Grout Aggregate: 3/8 inch maximum size and in accordance with ASTM C 404 "Standard Specification for Aggregates for Masonry Grout."
 - h. Grout Admixture: SIKA "Grout Aid," Type II.
 - i. Water: Clean and free of harmful amounts of acid, salts, alkali's, or organic materials.

2.3 MIXES

A. Mortar:

1. In accordance with CBC Section 2103A.2 and ASTM C 270 "Specification for Mortar for Unit Masonry".
2. Pre-Blended Mortar Mix:
 - a. In accordance with ASTM C 270 "Specification for Mortar for Unit Masonry," Type S.
3. Compressive Strength:
 - a. See General Structural Drawings from the Structural Engineer.
 - b. 1,800 psi at 28 days minimum.

B. Grout:

1. In accordance with CBC Section 2103A.3 and ASTM C 476 "Specification for Grout for Masonry."
2. Pre-Blended Bag Grout:
 - a. In accordance with ASTM C 476 "Specification for Grout for Masonry."
3. Coarse Grout Mix unless otherwise noted.
4. Compressive Strength:
 - a. See General Structural Drawings from the Structural Engineer.
 - b. 2,000 psi at 28 days minimum.

2.4 SOURCE QUALITY CONTROL

A. Fabrication Tolerances:

1. All materials, equipment and placing operations shall be subject to inspection, tests and approval at all times. Agent shall have access to all places where Concrete Masonry Unit materials are proportioned, mixed, cured and stored.

B. Tests and Inspection:

1. All tests will be performed by the Owner's Testing laboratory Agency in accordance with the Specification Section – TESTING LABORATORY SERVICES.
2. Concrete Masonry Units shall be tested per ASTM C 140 "Test Methods for Sampling and Testing Concrete Masonry Units and Related Units• " and CBC Section 1705A.4.
 - a. Lineal Shrinkage: In accordance with ASTM C 426 – "Standard Test method for Drying Shrinkage of Concrete Block."
 - b. Compressive Strength: In accordance with ASTM C 140 – "Sampling and Testing of Concrete Masonry Units."
 - c. Test three (3) samples of each type of the Concrete Masonry Unit prior to construction.
3. Mortar Tests: At the beginning of Masonry Work, at least 1 test sample each of mortar and grout shall be taken on 3 successive working days, then once per week with at least one sample taken for each 5,000 square feet of wall area, or fraction thereof.
 - a. Test specimens for mortar shall be made in accordance with ASTM C 780 "Test method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry." Test specimens shall be continuously stored in moist air until tested.
 - b. Mortar shall show a compressive strength of not less than 1,800 psi at 28 days.
4. Grout Tests: At the beginning of Masonry Work, at least 1 test sample each of grout shall be taken on 3 successive working days, then once per week with at least one sample taken for each 5000 square feet of wall area, or fraction thereof.

- a. Test specimens for grout shall be made in accordance with ASTM C 476 "Specification for Grout for Masonry" • and CBC Section 1705A.4 Test specimens shall be continuously stored in moist air until tested.
 - b. Grout shall show a compressive strength of not less than 2,000 psi at 28 days.
- C. Verification of Performance:
1. A special inspector shall be employed during the placement of all units, placement of all reinforcing steel, during all grouting operations and during taking of all test specimens.
 2. Reports:
 - a. Special Inspector shall submit to Architect and to DSA two copies of each report showing results of tests and inspections.
 - b. Report shall state that tests and inspections were made in accordance with specifications.
 - c. Report shall state whether materials were in conformance with specifications.
 3. Cost of testing and inspection will be paid by the Owner, unless otherwise specified. Contractor shall pay all costs of re-inspection and/or re-tests due to non-compliance with specifications as a reimbursement directly to the Owner.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which, affect the execution of work under this specification section.
 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
 - a. Installation of bolts, reinforcing, inserts, etc. as required.
 - b. Check and be responsible for accuracy of dowel locations in concrete where dowels project into Concrete Masonry Unit work.
 2. Control Joints:
 - a. See drawings for type and location of control joints.
 3. Bond Beams:
 - a. Bond beams shall be located where shown and detailed on the drawings, and shall be reinforced as indicated and as here after specified.
 4. Built-in Work:
 - a. Miscellaneous Embedded Items: All items indicated to be embedded in masonry shall be carefully located and anchored to prevent movement during grouting operations. Avoid cutting and patching.
 - 1) Install all anchor bolts and anchors furnished under other sections.
 5. Cutting or Patching:

- a. Obtain approval prior to cutting or fitting any area not indicated or where appearance or strength of masonry work may be impaired.

B. Protection:

1. Protect all adjacent surfaces from drips, spray, air pollution of the surrounding environment, and other damage from work under this specification section.
2. Protect and cover the top of all Concrete Masonry Unit walls at the end of each day's work to minimize water intrusion, regardless of the time of year.
 - a. Continue to temporarily cover the top of the walls until the final parapet cap is installed, and the sealer coats are applied.

C. Surface Preparation:

1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
3. Top surfaces of foundation or slab to receive Concrete Masonry Units shall be clean, rough, and free of laitance, as specified in Specification Section - CAST-IN-PLACE CONCRETE, PART 3. Roughness amplitude shall be a minimum of one-fourth inch.

3.3 INSTALLATION

A. General:

1. In accordance with Regulatory Requirements and TMS 602.
2. Set plumb, level, and square.
3. Provide temporary bracing during erection of masonry work. Maintain in place until masonry has set to provide permanent bracing.

B. Layout:

1. Lines shall be straight, true and built accurately to dimension.
2. Masonry lines and levels shall be placed to the following tolerances:
 - a. Variation from unit to adjacent unit: 1/8 inch maximum.
 - b. Variation from plane of wall: 1/4 inch in 10 feet.

C. Reinforcement Bar installation:

1. Installation of Vertical Reinforcement Bars:
 - a. Where possible, bars shall be one length and centered in open end of Concrete Masonry Units unless noted otherwise on drawings.
 - b. Bar may be doweled at top of footing.
 - c. Bars shall be accurately and positively held in place before setting Concrete Masonry Units by wiring to a 2 x 6 properly braced near top of bars and not over 8 feet above foundation or at last Grout pour.
 - d. For Low Lift Grout, corner bars and other bars in closed cell units shall be lapped a minimum of 48 bar diameters, unless indicated otherwise.
 - e. All vertical reinforcing steel shall be braced throughout its height in a manner that will retain the steel in proper position and provide the proper clearance at spacing not to exceed 192 bar diameters.
2. Installation of Horizontal Reinforcing Bars:
 - a. Bars shall be laid in bond beam units directly on top of the cross walls of block webs.
 - b. Lap splice bars a minimum of 48 bar diameters, unless indicated otherwise.
 - c. Reinforcing steel shall be secured to all foundation dowels and held in place at spacing not to exceed 192 bar diameters.

3. Wire horizontal and vertical bars together.
4. Reinforcing steel shall not be bent or straightened in a manner that will injure the material. Bars with kinks or bends not shown on the plans shall not be used. Heating of bars for bending will not be permitted.
5. Bars shall conform accurately to the sizes, shapes, lines and dimensions shown on drawings and with hooks and beds made as detailed. Bars shall be placed as indicated on the drawings and centered on grout space.
6. At the time grout is placed around it, reinforcing steel shall be clean of mill scale or other coatings that will destroy or reduce bond.

D. Setting of Concrete Masonry Units - In accordance with the following:

1. Bonds: Use Running Bond, or as shown on details.
 - a. Place masonry to lines and levels indicated to the following tolerances:
 - 1) Variation from Unit to Adjacent Unit: 1/8-inch max.
 - 2) Variation from Plane of Wall: 1/4-inch in 10 feet.
 - b. Bond: Unless noted otherwise, lay concrete masonry units in bond pattern indicated with vertical joints located over score of unit in course below (and vice versa).
 - c. Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.
 - d. Preserve the vertical continuity of cells in concrete unit masonry. The minimum clear horizontal dimensions of vertical cores shall be 3" x 3" for 8-inch wide block.
2. Align vertical cells to maintain vertical continuity of cells to be filled. Open end or notched units may be used to facilitate installation around cells that contain vertical reinforcement. Minimum unobstructed vertical flue 3" x 3". Remove overhanging mortar or other obstructions or debris from inside of cells.
3. Provide bond beam units at cells containing horizontal reinforcement.
4. Integral Water-Repellent CMU:
 - a. Installer shall use only mortar containing compatible integral liquid water-repellent mortar admixture at the manufacturer's recommended addition rate and mixed according to manufacturer's recommended instructions for construction of water repellent masonry exterior walls.
 - b. Cover top of unfinished masonry work to protect it from the weather and to prevent accumulation of water in the cells of the CMU.
 - c. Cleaning:
 - 1) Remove "primary" efflorescent from masonry walls exposed in the finished work in accordance with the manufacturer's recommendations and the NCMA TEK Bulletin #8-3A.
 - 2) Remove dirt or stains from masonry walls exposed in the finished work in accordance with the manufacturer's recommendations and the NCMA TEK Bulletin #8-2A.
 - 3) Promptly remove excess wet mortar and grout containing integral water-repellent mortar admixture from the face of the masonry as work progresses. Do not use strong acids, over-aggressive sandblasting or high-pressure cleaning methods.
 - 4) Comply with applicable environmental laws and restrictions.
5. Joints:
 - a. Set Concrete Masonry Units in full shoveled bed of Mortar.
 - b. Width of joint: 3/8 inch.
 - 1) Depth of joint: Equal to Face Shell Wall Thickness.
 - c. Head joints shall be solidly filled.
 - d. Mortar Joint Finish Method:

- 1) All mortar joints shall be compressed and shaped by a specific designated tool throughout the project. Provide identical tools when more than one worker is scheduled to finish joints.
 - 2) At exposed and concealed surfaces:
 - a) Vertical Joints: Compressed, Raked and Tooled joints.
 - b) Horizontal Joints: Compressed, Raked and Tooled joints.
 - 3) Provide compressed Flush Joints when other material is to be applied directly onto and over Concrete Masonry Units being covered (including areas covered by rubber base).
6. Vertical Control Joints:
- a. Space joints at 25'-4" o.c. maximum, unless specifically noted otherwise. Joints shall be spaced symmetrically and uniformly and shall be subject to the Architect's approval.
 - b. All joints shall be through wall separations with horizontal reinforcing discontinuous.
 - c. All joints shall be sealed with backer rods and urethane sealant on both faces. Refer to Specification Section - SEALANTS for sealant requirements.
7. Prior to grouting, the grout space shall be clean so that all spaces to be filled with grout do not contain mortar projections greater than 1/4 inch, mortar droppings and other foreign material, per CBC Section 2104A.1.3.
8. Do not install cracked, broken, chipped or stained masonry units.
9. Lay only dry concrete masonry units.
10. Lay masonry in full bed of mortar, properly jointed with other work. Deep or excessive furrowing of mortar joints is not permitted.
- a. Block Cap: Lay with full mortar coverage on horizontal and vertical joints.
 - b. Install grout cap where and as indicated.
11. Fully bond intersections and external and internal corners.
12. Do not shift or tap masonry units after mortar has taken initial set. Where adjustments must be made, remove mortar and replace.
13. Remove excess mortar.
14. Perform job-site cutting with proper tools to provide straight unchipped edges. Take care to prevent breaking masonry unit corners or edges.
15. Step back unfinished work for joining with new work. Do not use tothing.
16. Provide cleanouts as indicated in "installation of grout."
- E. Installation of Grout:
1. General:
 - a. All cells shall be grouted solid.
 - b. Use low lift or high lift grouting at Contractor's option.
 - c. Use grout pump, hopper or bucket to place grout.
 - d. Place grout in final position within 1-1/2 hours after introduction of mixing water.
 - e. Place grout and rod with a 3/4 inch flexible cable vibrator sufficiently to case it to flow into all voids between the cells and around the reinforcing steel. Slushing with mortar will not be permitted.
 - f. Stop grout approximately 1-1/2 inches below top of last course, except at top course bring grout to top of wall.
 2. Low Lift Grouting Procedure: In accordance with CBC Section 2104A.1.3.1.2.2, and to be used only if approved by the Architect.
 - a. Set all vertical bars.
 - b. Concrete Masonry Unit walls shall be built up 16 inches high uniformly around one complete building unit. No vertical construction joints will be allowed unless noted and detailed on the drawings.
 - c. Lay Concrete Masonry Units no higher than 24" and clean cells of mortar.
 - d. Lay Concrete Masonry Units a maximum of 48" before grouting.

- e. Set horizontal bars on bond beam unit crosswalls next to verticals.
 - f. If course at top of lift contains horizontal reinforcement, grout all cells to a level 3/4" below the top of the Concrete Masonry Units. This will provide about 1-1/4" grout cover over the horizontal bar. Puddle grout in place using a No. 4 bar or a 1 x 2 stick, and repeat puddling in 30 to 60 minutes.
 - g. Consolidate each lift twice. Once while placing grout and once more after initial absorption of water but before set.
 - h. Repeat steps "c.", "d.", "e." and "f." above until the wall is completed.
3. High Lift Grouting Procedure (only upon prior approval of the Architect, Structural Engineer and DSA) shall be in accordance with CBC Section 2104A.1.3.1.2.3.:
- a. Clean-outs must be provided at the bottom of each pour for each cell.
 - 1) Construct clean out courses with inverted open-bottom bond beam units involved to permit cleaning of all cells by flushing. Cleanouts shall not be less than 3x4 inch openings cut from one full shell. Do not plug cleanout holes until masonry work, reinforcement and final cleaning of the grout spaces have been completed and inspected.
 - b. The Contractor is cautioned that with the high lift method, the walls have very little lateral stability against winds or earthquake before grout has set and it shall be this Contractor's responsibility to adequately brace the walls until the roof sheathing is installed.
 - c. "Dur-O-Wall" reinforcing shall be provided in mortar joints at all wall corners, ends, jambs of openings and wall intersections.
 - d. Lay up walls subject to maximum height limitations of CBC Section 2104A.1.3.1.2.2 or 2104A.1.3.1.2.3.
 - e. Construction procedure shall be as follows:
 - 1) Set all full length vertical bars on center line of wall, centered in cells, and braced as noted above under typical reinforcing.
 - 2) Lay Concrete Masonry Units full height of walls, or 12 feet maximum including wiring horizontal bars to verticals, for one complete building unit. No vertical construction joints will be allowed unless noted and detailed on the drawings.
 - 3) Construct clean out courses with open-bottom bond beam units inverted to permit cleaning of all cells by flushing. Cleanouts shall not be less than 3 x 4 inch openings cut from one full shell. Do not plug cleanout holes until masonry work, reinforcement and final cleaning of the grout spaces have been completed and inspected.
 - 4) Clean all cells and top of foundation wall of mortar by hosing cells with suitable nozzle jet or sandblasting as soon as mortar has partially set. Final cleaning shall be inspected through clean-outs at each cell in base of wall. Remove all mortar fine protruding more than 1/2 inch into the grout space by dislodging the projections with a rod as the work progress or by washing the grout space at least twice a day during erection using a high pressure stream of water.
 - 5) Set vertical bars in closed cells where required; i.e., at wall corners, sides of openings, etc. Wire to horizontals at top and bottom. Use metal spacers at 48" o.c. maximum to hold bars in line.
 - 6) No grout shall be placed until mortar has set a minimum of 3 days in hot weather or 5 days in cold weather, and the top of foundation wall has been thoroughly cleaned and grout plugs have cured a minimum of 48 hours.

- 7) Place grout in lifts not to exceed 4 feet in height, with a waiting period between lifts, dependent on weather and absorption rate of the masonry, in order to place the succeeding lift after the preceding lift becomes plastic but prior to initial set. The first lift shall be consolidated using mechanical vibrators. After the required waiting period, place the second lift and consolidate with the vibrator, reconsolidating the lift below to a depth of 12 to 18 inches. Repeat the waiting, placing and consolidating process until the top of the grout pour is reached. Reconsolidate the top lift after the required waiting period. The high-lift grouting of any section of wall between lateral flow barriers shall be completed to the top of a pour in one working day unless a new series of clean out holes is established and the resulting horizontal construction joint cleaned.
- 8) Repeat items 1 - 7 until all cells are filled. The wall must be grouted to its full height during one working day. No horizontal construction joints will be allowed.
- 9) Above 12 feet level low lift grouting procedures shall be used.

F. Curing:

1. While Concrete Masonry Units are being laid and after, dampen both faces for a period of 3 days using a spray regulated to keep surface damp. After grouting, dampen for a period of 24 hours.

3.4 REPAIR / RESTORATION

A. General:

1. Materials or Workmanship not conforming to appearance or strength specified will be deemed defective and shall be removed and replaced with no change to the contract in time or cost.
2. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units.
3. Pointing: During the tooling of joints, enlarge any voids or holes and completely fill with mortar.
4. Dry brush masonry surface after mortar has set, at the end of each day's work and after final pointing.
5. Leave work and surrounding surface clean and free of mortar sports and droppings.
6. Cleaning: Upon completion of masonry installation, repair all holes. Defective joints shall be cut out and rejointed. Exposed masonry surfaces shall be cleaned free of mortar, or grout stain and efflorescence.

B. Defective Mortar Or Grout:

1. Should the strength of mortar or grout fall below that specified, remainder of Work shall be adjusted to reach required strength. Work in place representing inferior grout and mortar and indicating a strength less than the minimum specified shall be tested by taking and testing core samples. Number and location of cores shall be determined by Structural Engineer.
2. Should compression tests of cores fail to meet required strength, masonry shall be deemed to be defective and shall be removed and replaced at no cost to Owner.
3. Costs relative to taking and testing of core samples shall be paid by the Owner and will be deducted from Contract Amount. Cost of patching core holes shall be borne by the Contractor.

3.5 FIELD QUALITY CONTROL

A. Site Tests:

1. Tests will be performed by the Owner's Testing Laboratory Agency in accordance with the Specification Section – TESTING LABORATORY SERVICES.
2. Mortar and Grout shall be tested per CBC Section 2105A.
 - a. Samples shall be continuously stored in moist air until tested.
 - b. Grout Compressive Strength: For each mix provided, in accordance with ASTM C 1019 "Standard Test Method for Sampling and Testing Grout".
 - c. Mortar Property Specification: For each mix provided in accordance with ASTM C 780 "Standard Test method for Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry."
3. Masonry Core test shall be in accordance with CBC Section 2105A.4.
4. One set of tests for each 5,000 square feet of wall area or portion thereof.

B. Inspection:

1. Inspections will be performed by the Owner's Project Inspector in accordance with Specification Section – TESTING AND INSPECTION SERVICES.
 - a. Special Project Inspector shall be employed during the placement of all units, placement of all reinforcing steel, during all grouting operations and during taking of all test specimens.
 - 1) Per CBC Section 1701A.4 for DSA/SSS.
2. Schedule inspections and notify the Architect, Project Inspector, Testing Agency and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the required inspections.

3.6 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.

1. At the conclusion of the Concrete Masonry Unit work, the Contractor shall clean down all walls, remove all scaffolding and equipment, clean up all debris, refuse, any surplus materials and remove them from the premises.
2. Concrete Masonry Unit walls shall be brushed daily with a mason's soft hair brush to remove surplus mortar and splattering at scaffolding lines. This must be done immediately after initial, but before final set.
3. Grout or mortar spillage shall be removed by use of clean, plain water before it has a chance to set.
4. In areas not cleaned in accordance with the above, the Architect shall have the right to require sandblasting of the entire wall between concrete columns or piers, between control joints or entire wall unit that includes the affected areas.

B. Removal of Stains and Efflorescence:

1. Removal of Stains: In accordance with NCMA TEK Bulletin #8-2A "Removal of Stains from Concrete Masonry."
2. Removal of Efflorescence: In accordance with NCMA TEK Bulletin #8-3A "Control and Removal of Efflorescence."

3.7 PROTECTION

A. Protection from Weather:

1. Protect newly installed work from temperatures in accordance with CBC 2104A.

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- a. Cold Weather: When ambient air temperature falls below 40 degrees F.
 - b. Hot Weather: When ambient air temperature rises above 100 degrees F.
2. During installation, cover the top of unfinished masonry work to protect it from the weather and to prevent accumulation of water in the cores of the masonry units.

END OF SECTION

SECTION 051200 – STEEL AND FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install all Steel and Fabrications, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 03 11 01 CONCRETE FORMWORK
 4. 03 15 14 DRILLED ANCHORS
 5. 03 20 00 REINFORCEMENT
 6. 03 30 00 CAST-IN-PLACE CONCRETE (Grouting of Bearing Plate)
 7. 04 22 00 CONCRETE MASONRY UNITS
 8. 05 30 00 METAL DECK
 9. 06 10 00 ROUGH CARPENTRY
 10. 06 17 13 COMPOSITE LUMBER
 11. 06 41 23 MODULAR CASEWORK
 12. 07 21 00 INSULATION
 13. 07 60 00 SHEET METAL
 14. 07 72 00 ROOF ACCESSORIES
 15. 08 33 00 COILING DOORS
 16. 08 70 00 HARDWARE
 17. 09 22 16 METAL FRAMING
 18. 09 50 00 ACOUSTICAL CEILINGS
 19. 09 91 00 PAINTING
 20. 10 05 00 MISCELLANEOUS SPECIALTIES
 21. 10 11 00 VISUAL DISPLAY BOARDS
 22. 10 44 00 FIRE PROTECTION SPECIALTIES
 23. 11 66 43 SCOREBOARDS
 24. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 25. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. Standards:
1. In accordance with Specification Section – REGULATORY REQUIREMENTS and the following standards:

- a. AISC: American Institute of Steel Construction "Specification for Design, Fabrication and Erection of Structural Steel buildings" and "Code of Standard Practice for Steel Buildings and Bridges" and "Recommended Procedure for Identification of High Strength Steels During Fabrication."
 - 1) NOTE: All connections shall be designed by the Structural Engineer and approved by DSA/SSS.
 - 2) NOTE: All connections shall be as shown in the Contract Document drawings.
 - 3) AISC: "Architecturally Exposed Structural Steel" 2016 AISC "Code of Buildings and Bridges," Section 10.
 - 4) AISC: "Specification for Structural Joists using ASTM A 325 or ASTM A 490 Bolts."
 - 5) AISC: "Specification for Structural Steel Buildings" using the AISC 360-16.
 - 6) AISC 341-16 Seismic Provisions.
- b. ANSI: American National Standards Institute:
 - 1) ANSI B18.22.1 "Plain Washers."
 - 2) ANSI B18.22.1 "Beveled Washers."
- c. ASTM: American Society for Testing and Materials.
 - 1) ASTM A 123: Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
 - 2) ASTM A 153: Standard Specification for Zinc (Hot-Dip) on Iron and Steel Hardware.
 - 3) ASTM A 385: Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
 - 4) ASTM A 780: Standard Specification for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- d. AWS: American Welding Society "Structural Welding Code."
 - 1) AWS D1.1 "Structural Welding Code."
 - 2) AWS D1.8 "Structural Welding Code - Seismic Supplement."
 - 3) AWS A2.0 "Welding Symbols."
- e. EF: Engineering Foundation, "Specification for Structural Joints Using bolts from ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength."
- f. ICC: International Code Council
- g. NAAMM: National Association of Architectural Metal Manufacturers
 - 1) Metal Stairs Manual
 - 2) Pipe Rail Manual.
- h. RCSC: Research Council on Structural Connections, "Specification for Structural Joints" Using ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength."
- i. SSPC: The Society for Protective Coatings.
 - 1) SSPC-SP 1 "Solvent Cleaning."
 - 2) SSPC-SP 2 "Hand Tool Cleaning."
 - 3) SSPC-SP 3 "Power Tool Cleaning."
 - 4) SSPC-SP 6 "Commercial Blast Cleaning."
 - 5) SSPC-SP 7 "Brush-Off Blast Cleaning."

1.3 DEFINITIONS

A. Welding Definitions:

1. CVN Charpy V-Notch (Testing Procedure).
2. FCAW Flux Core Arc Welding.
3. FCAW-G Flux Core Arc Welding-Gas Shielded.
4. FCAW-SS Flux Core Arc Welding-Self Shielded.
5. G-MAW Gas Metal Arc Welding.
6. SMAW Shielded Metal Arc Welding.
7. SAW Submerged Arc Welding.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

1. Product Data.
 - 1) Submit Load Indicating Device information as indicated in Part 3 of this Specification Section, and include Laboratory Test Reports and other data to show compliance with Specification (include Specified Standards).
 - 2) Include certified copies of mill reports covering chemical and physical properties of each type of steel.
 - 3) Submit primer paint system. Obtain certification from the project's Painting Contractor and Paint Manufacturer that primer paint system is compatible with proposed painting systems for this project.
2. Shop Drawings.
 - a. The Contract Drawings represent the spatial relationship as conceived by the Architect.
 - 1) The production of the structural steel Shop Drawings may require the employment and utilization of a 3-dimensional structural steel fabrication layout program to achieve the exact relationship of all intersecting members.
 - 2) Building sections and details represent interpretations of these relationships and the dimensions shown shall not be relied upon for accuracy and fit, but the Contractor / Structural Steel Fabricator shall verify them and double-check them for accuracy and fit.
 - 3) Any significant variations shall be submitted to the Architect and Structural Engineer for review and approval, of which the conditions may or may not require DSA review and approval.
 - 4) "Fit-Up" means and methods are the sole responsibility of the Contractor.
 - b. Provide all information necessary for the fabrication of component parts. Indicate size and weight of members, type and location of shop and field connections, size and extent of all welds, and welding sequence when required.
 - c. Include details of cuts, connections, camber, holes and other pertinent data. Include welds by Standard AWS Symbols, and show size, length and type of each weld.
 - d. Provide sections, drawings, templates and directions for installation of anchor bolts and other anchors.

- e. Dimension requirements of structural steel for manufactured items, such as Mechanical Equipment, Dock Levelers, etc. All of these items shall be coordinated and provided by the General Contractor. The General Contractor shall also coordinate and provide dimensions to locate Structural Steel for Window Washing supports such as davits, tie-backs, etc.
- 3. Samples.
 - a. Provide material samples cut and machined for testing without charge to the Owner.
- 4. Quality Assurance/Control Submittals.
 - a. Test Reports:
 - 1) Submit mill analysis and test reports for each heat, in accordance with ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use," certifying conformity with the Specifications. Steel shall be identifiable in the fabricating shop.
 - 2) Submit test reports for each lot of high strength bolts in accordance with ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" and ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength."
 - 3) Submit Welding Procedure Specification (WPS) to the Structural Engineer for review prior to use.
 - a) For WPS's that have been qualified by test, the supporting Procedure Qualification Record (PQR) shall be submitted to the Structural Engineer for review prior to use.
 - 4) Submit to the Structural Engineer for approval, a step by step welding sequence for the field welding of each type of connection.
 - 5) Submit to the Structural Engineer a quality control plan that addresses all inspection issues, including in process and final inspection that are addressed in AWS D1.1.
 - b. Certificates:
 - 1) Submit current valid certificate issued by an independent testing agency for all welders, welding operators, and tack welders.
 - 2) Certification of Welder's Qualifications: Welders that will make welds in restricted access, such as, but not limited to, the bottom flange-to-column welds through a cope hole or access hole in the beam web, shall be qualified by the Contractor using the same welding procedure as will be used for production and a mock-up assembly that simulates the construction configuration.
 - 3) Provide Certified Mill Test Report Sheets in accordance with ASTM A123 "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products," certified at the plant after galvanizing, but prior to shipment.
- 5. Closeout Submittals:
 - a. Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.
 - b. Warranty.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer Qualifications:

- a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - b. Welders shall be recently qualified by Test as prescribed in AWS "Structural Welding Code" for the type of welding to be performed.
 - 1) All welders, welding operators, and tack welders shall be qualified with the largest diameter electrode(s) to be used on the work by test and hold a current valid certificate issued by an independent testing agency, to perform the type of welds required by the work; including the process, position, and thickness of materials used (AWS D1.1: Clauses 3 & 4 Sections).
 - 2) In addition to meeting the requirements of AWS, welders that will make welds with restricted access, such as, but not limited to, the flange to column welds through a cope hole or access hole in the beam web, or where access to the bottom of a groove is restricted by the presence of a column flange, shall be qualified by the Contractor using the same welding procedure as will be used for production and a mock-up assembly that simulates the construction configuration.
 - 3) All welders on the project shall be capable of understanding and following the requirements of the written WPS.
 - 4) Each welder employed on the project shall understand all the requirements of this welding specification before welding on the project.
 - 5) The written WPS shall be available to the welder, welding supervisor, and all inspectors.
 - 6) Provide weld procedures for both pre-qualified welds and special welds to be submitted to the Owner's Testing laboratory and the Architect. Procedures shall be provided for both shop & field welds and shall be provided prior to commencing welding operations.
 2. Manufacturer/Supplier Qualifications:
 - a. Structural Steel firm experienced in successfully producing/supply capacity to produce/supply required units without causing delay in the Work.
 - b. Provide documentation that the Hot-Dipped Galvanizer is a member in good association with the AGA (American Galvanizers Association).
 3. Metal Stair Qualifications:
 - a. For all surfaces exposed to view, use materials, that are smooth and free of surface blemishes including pitting, seam marks, rolled trade names and roughness.
 - b. All loading conditions resulting in eccentricities or torsion to beams and/or columns shall be resolved by the Installation of stiffeners and diagonal struts designed, supplied, and installed by the stair supplier.
 - c. Take field measurements prior to preparation of shop drawings and fabrication; do not delay job progress; allow for trimming and fitting where necessary.
 - d. Concrete for treads and landings shall attain a minimum strength of 3,000 psi in 28 days.
 - e. Metal stairs and intermediate landings:
 - 1) Stair pans and risers shall be a minimum of 10 gage material. Actual gage as required by design.
 - 2) Stringer and member sizes indicated on drawings shall be the minimum sizes allowed. Flat plate stringers are not acceptable substitutions.
- B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:

- a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Mockups:

1. A typical mockup of welded connections shall be provided prior to shop fabrication.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Product Handling:

1. Store materials to permit easy access for inspection and identification. Keep steel members off the ground using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.

1.7 SCHEDULING

- A. Schedule the Work so that there will be no excessive inspection time. At all times that an inspector is required, sufficient work shall be laid out and adequate personnel supplied so that the Inspector's time will be used to full advantage. If inspection costs become excessive because of poor shop procedure, such excess costs will be paid for by the Owner, but deducted from the Contract Price. Poor procedures will be determined upon review of Inspection and/or Testing Reports. The rate for charging the excess costs will be as follows:

1. Minimum of three (3) certified welders are used, Owner will pay 100 percent.
2. Only two (2) certified welders are used, Contractor will be charged 1/3 of the Inspection cost.
3. Only one (1) certified welder is used, the Contractor will be charged 2/3 of the inspection cost.

1.8 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.

C. Installer's Warranty:

1. In accordance with the terms of the Specification Section - WARRANTIES
 - a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified Metal Panel product manufacturer, or approved equivalent:
 - a. McNICHOLS COMPANY:
 - 1) "Perforated Panels":
 - a) Stainless Steel.
 - 2) "Solid Panels":
 - a) Continuous Sheet.
 - b) Cylindrical "Can" Shape.
 2. Specified Galvanized Steel Wire Cloth product manufacturer, or approved equivalent:
 - a. McNICHOLS COMPANY:
 - 1) Plain Weave, 1" square opening.
 - 2) Woven Weave, 1" square opening.
 3. Specified Plastic Steel Putty product manufacturer, or approved equivalent:
 - a. DEVCON Plastic Steel Putty A.
 4. Specified primer paint product manufacturer, or approved equivalent:
 - a. PPG PAINTS, INC.
 5. Specified galvanized repair paint product manufacturer, or approved equivalent:
 - a. AERVOE INDUSTRIES, INC.
 - 1) Zinc Rich Galvanize #1141.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Steel:
1. Structural Shapes, Plates, and Bars: Shall be made in accordance with ASTM A 36, "Specifications for Carbon Structural Steel."
 - a. ASTM A 572, "Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel," Grade 50.
 - b. ASTM A 992, "Standard Specification for Steel for Structural Shapes for use in Building Framing" Grade 50.
 2. Pipe: Shall be in accordance with "Specifications for Welded and Seamless Steel Pipe," ASTM A 53 "Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless," Grade B.
 - a. Finish: Type E, for concealed conditions, Black, except where indicated on the drawings to be galvanized.

- b. Finish: Type S, for visually exposed conditions, Black, except where indicated on the drawings to be galvanized.
3. Structural Tubes:
 - a. Cold-Formed tubing: Shall be in accordance with ASTM A 500 "Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes," Grade B.
 - b. Hot-Formed tubing: Shall be in accordance with ASTM A 501 "Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing."
 - c. All HSS sections (round and square) shall have their material certifications reviewed by the special inspector.
 - 1) The special inspector shall verify that all seam welds are fused in accordance with ASTM A 500 "Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes," Grade B.
 - 2) The special inspector shall, as a minimum, visually inspect the exterior of all seam welds.
- B. Light Gage Cold Formed Shapes: In accordance with the following, unless otherwise noted on the Structural Engineer's Drawings:
 1. ASTM A 653 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process," such as "Zee" purlins, angles bent plated, etc.
 2. ASTM A 1011 "Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability."
- C. Panels:
 1. Perforated Panels :
 - a. Manufacturer: McNICHOLS COMPANY.
 - b. Quantity: Continuous Sheet with no joints.
 - c. Material: Stainless Steel, Type 304, #4 Finish.
 - d. Thickness: 16 Gage.
 - e. Width and Length: See Drawings.
 - f. Perforation: 1/4" with 5/16" staggered centers with 58% open area.
 - g. Panel Ends and Edges: 1" margin at perimeter with hemmed edges.
 2. Non-Perforated Solid Panels (Type 3):
 3. Non-Perforated Solid Panels (Type 4):
- D. Wire Cloth: Galvanized Steel as manufactured by McNICHOLS COMPANY:
 1. Plain Weave, 1" square opening
 2. Woven Weave, 1" square opening
- E. Plastic Steel Putty:
 1. Manufacturer: DEVCON.
 2. Material: Plastic Steel Putty "A".

2.3 COMPONENTS

- A. Fasteners shall be in accordance with the following, unless otherwise noted on the Structural Engineer's Drawings:

1. Anchor Bolts:
 - a. All anchor bolts cast in concrete or masonry shall be headed bolts with cut threads conforming to:
 - 1) ASTM A 36 "Standard Specification for Carbon Structural Steel" or;
 - 2) ASTM A 572 "Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel" Grade 50 as indicated on drawings, or;
 - 3) ASTM F 1554 "Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength."
2. Machine Bolts:
 - a. ASTM A 307 "Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength."
3. Direct Tension Indicators:
 - a. Provide in accordance with ASTM F 959 "Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners," type as required.
 - 1) Use on all bolts for ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" and ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength."
4. High Strength Bolts, Nuts and Washers: Install in accordance with requirements for ASTM F 3251 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" and ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength" slip critical and snug tight conditions as indicated on drawings. Install high strength bolts with snug tight type connections with threads included in shear plane except as otherwise noted. Install hardened washers in conformance with AISC Specifications.
 - a. Bolt Specifications: Bolts shall conform to the requirements of the current edition of the Specifications of the American Society for Testing and Materials for High-Strength Bolts for Structural Steel Joints, ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength," ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength" as indicated on drawings.
 - b. Bolt Geometry: Bolt dimensions shall conform to the current requirements of the American National Standards Institute for Heavy Hex Structural Bolts, ANSI Standard B18.2.1. The length of bolts shall be such that the end of the bolt will be flush with or outside the face of the nut when properly installed.
 - c. Provide hexagonal heads and nuts for all connections per ASTM A 563 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process," Appendix Table X1.1.
 - d. Nut Specifications: Nuts shall conform to the current chemical and mechanical requirements of the American Society for Testing and Materials Standard Specification for Carbon and Alloy Steel Nuts, ASTM A 563 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process," Appendix Table X1.1 Provide grade A Heavy Hex nuts for ASTM A 36 threaded rods. Use grade C, Heavy Hex nuts for ASTM A 572 "Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel" Grade 50 and ASTM A 588 "Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi (345 Mpa) Minimum Yield Point to 4-inc (100-mm) Thick" threaded rod.

- e. Washers: Flat circular washers and square or rectangular beveled washers shall conform to the current requirements of the American Society for Testing and Materials Standard Specification for Hardened Steel Washers, ASTM F 436 "Standard Specification for Hardened Steel Washers."
- f. Tension Control Fastener System:
 - 1) LOHR, LEJEUNE, NUCOR FASTENER, CORDOVA BOLT, INC., or approved equivalent.
- 5. Stud-Type Shear Connectors: ASTM A 108 "Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality" Grade 1015 or 1020 Cold-finished carbon steel with dimensions complying with AISC Specifications.
- 6. Power Driven Fasteners: Tempered steel pins with special corrosive resistant plating or coating. Pins shall have guide washers to accurately control penetration. Fastening shall be accomplished by low-velocity piston-driven power activated tool. Pins and tool shall be as manufactured by Hilti Fastening Systems.
- 7. Filler Metal and Welding Flux in accordance with AWS D1.1 Clause 5 "Fabrication Section", and AISC 360, Section A3.5, and shall meet a CVN Impact Energy of 20 ft-lbs at minus 20 Degrees F.
 - a. FCAW A5.20 or A5.29 E7XT-X.
 - b. G-MAW A5.18 or A5.28 E70S-X.
 - c. SAW A5.17 or A5.23 E7X-EXXX.
 - d. SMAW A5.1 or A5.5 E70XX Low Carbon.
- 8. Turnbuckles:
 - a. ASTM F 1145, "Standard Specification for Turnbuckles, Swaged, Welded, Forged."
 - b. The supplier shall provide turnbuckles manufactured from the same production lot.
 - c. The manufacturer shall provide test reports indicating the safe load of the turnbuckles using a safety factor of 5.
 - d. Turnbuckles shall be in compliance with ASTM F 606 "Standard Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, and Rivets."

2.4 FABRICATION

- A. Shop Assembly:
 - 1. Fabricate in accordance with AISC Spec and AISC Code unless otherwise indicated on Drawings or Specifications.
 - a. Mechanically curve specific Structural members as indicated on the drawings in accordance with AISC requirements and tolerances.
 - 2. Fabricate all structural steel members and fittings.
 - 3. Fabricate all miscellaneous metal fabrications scheduled in Part 3 of this Specification Section.
 - 4. Architecturally Exposed Structural Steel and "Exposed to View" Metal Fabrications:
 - a. Comply with AISC - "Architecturally Exposed Structural Steel" 2010 AISC "Code of Buildings and Bridges," Section 10.
 - b. At all exposed joints, continuous fill with Plastic Steel Putty. Sand smooth and uniform and ready to receive finishes.
 - 1) Clean all areas to have smooth seams with manufacturers recommended cleaner.
 - 2) Place Steel Putty and cure.
 - c. Also, refer to drawings.

- B. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with the AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated to provide the flattest floor possible. The contractor shall coordinate member tolerances with finishes.
1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
 2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
 3. Columns:
 - a. All columns and beams shall adhere to Section M2.7 of the referenced "Specification for Structural Steel for Buildings" which states that completed members shall be free of twists, bends, and open joints.
- C. Connections: Weld or bolt shop connections, as indicated. Bolt field connections, except where welded connections or other connections are indicated.
- D. Unless noted otherwise, make holes 1/16 inches larger than the nominal bolt diameter.
1. For anchor bolts, the hole diameter may not exceed the sizes indicated in CBC Section 2204A.4, nor what is specified on the drawings.
- E. Welding, Shop and Field: Weld by shielded arc method, submerged arc method, flux cored arc method, or other method approved by AWS. Perform welding in accordance with AWS Code. All welders, both manual and automatic, shall be certified in accordance with AWS "Standard Qualification Procedure" for the Work to be performed. See paragraph "welding" herein, for detailed requirements. If sizes of fillet welds are not shown on drawings, use AWS minimum weld size but not less than 3/16 inch fillet welds.
- F. Bolt Holes for Other Work: Provide holes required for securing other work to structural steel framing.
1. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.
 2. Cut, drill or punch holes perpendicular to metal surfaces and remove all burrs. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.
- G. AISC Heavy Section shapes and built up members shall meet the requirements for joints in AISC Sections J1.5, J1.6, J2.7 and M2.2.
- H. High Strength Bolts:
1. Installation and Tightening:
 - a. Handling and Storage of Fasteners: Fasteners shall be protected from dirt and moisture at the job site.
 - 1) Only as many fasteners as are anticipated to be installed and tightened during a work shift shall be taken from protective storage.
 - 2) Fasteners not used shall be returned to protected storage at the end of the shift.
 - 3) Fasteners shall not be cleaned of lubricant that is present in as-delivered condition.
 - b. Tension Calibrator: A tension measuring device shall be required at all job sites where bolts in slip-critical joints are being installed and tightened.

- 1) The tension measuring device shall be used to confirm:
 - a) The suitability to satisfy the requirements of AISC for the complete fastener assembly, including lubrication if required to be used in the work,
 - b) Calibration of wrenches, if applicable, and
 - c) The understanding and proper use by the bolting crew of the method to be used.
- 2) The frequency of confirmation testing, the number of tests to be performed and the test procedure shall be as specified in 1.d. below, as applicable.
 - a) The accuracy of the tension-measuring device shall be confirmed through calibration by an approved testing agency at least annually.
- c. Joint Assembly and Tightening of Shear/Bearing Connections: Bolts in connections not within the slip-critical category shall be installed in properly aligned holes, but need only be tightened to the snug tight condition.
 - 1) The snug tight condition is defined as the tightness that exists when all plies in a joint are in firm contact.
 - 2) This may be attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench.
 - 3) If a slotted hole occurs in an outer ply, a flat hardened washer or common plate washer shall be installed over the slot.
- d. Joint Assembly and Tightening of Connections Requiring Full Pre-tensioning. Slip-critical connections shall be installed in properly aligned holes and tightened by one of the following methods.
 - 1) Turn-of-nut Tightening: When turn-of-nut tightening is used, hardened washers are not required except as specified in the AISC.
 - a) A representative sample of not less than three bolts and nuts of each diameter, length and grade to be used in the work shall be checked at the start of work in a device capable of indicating bolt tension.
 - b) The test shall demonstrate that the method of estimating the snug-tight condition and controlling turns from snug tight to be used by the bolting crews develops a tension not less than five percent greater than the tension required for slip-critical connections.
 - 2) Installation of Alternate Design Bolts: A representative sample of not less than three bolts of each diameter, length and grade shall be checked at the job site in a device capable of indicating bolt tension.
 - a) The test assembly shall include flat-hardened washers, if required in the actual connection, arranged as in the actual connections to be tensioned.
 - b) The calibration test shall demonstrate that each bolt develops a tension not less than five percent greater than the tension required by AISC.
 - c) Manufacturer's installation procedure shall be followed for installation of bolts in the calibration device and in all connections.
 - d) When alternate design features of the fasteners involve an irreversible mechanism such as yield or twist-off of an element, bolts shall be installed in all holes of the connection and initially brought to a snug tight condition.

- e) All fasteners shall then be tightened, progressing systematically from the most rigid part of the connection to the free edges in a manner that will minimize relaxation of previously tightened fasteners prior to final twist-off or yielding of the control or indicator element of the individual fasteners.
 - f) In some cases, proper tensioning of the bolts may require more than a single cycle of systematic tightening.
- e. Mark bolts that have been completely tightened with an identifying symbol.
- 1) Final tightening of high strength bolts in webs of beam to column moment connections shall be performed after completion of flange welding.

I. Welding - General:

1. General: Quality of materials and design and fabrication of all welded connections shall conform to AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Building," "AWS Code for Welding in Building Construction," and requirements of this section.
 - a. Location and type of all welds shall be as shown. Make no other welded splices, except those shown on drawings, without prior approval of the architect.
2. Automatic Welding: Use electrode wire and flux for automatic and semi-automatic welding acceptable to Architect. All methods, sequences, qualification and procedures, including preheating, and post heating if necessary, shall be detailed in writing and submitted to the architect for review.
3. Qualification of Welders:
 - a. Structural steel welding: Manual and automatic welds for structural steel construction shall be made only by operators who have been previously qualified by tests, as prescribed in AWS D1.1 to perform type of work required.
 - b. Welders shall be checked by the welding inspector. Those not doing satisfactory work may be removed, and may be required to pass qualification tests again. All qualification testing shall be at the Contractor's expense.
 - c. Only welders whose weld procedures and pre-qualification by testing that have passed shall be considered qualified for such welds.
4. Control cooling process after weld is completed by either step down post heat or thermal blankets as determined by procedures and prequalification.
5. Box columns and built-up members shall have ultrasonic testing before and after welding.
6. Flame cut surfaces shall be ground to remove contaminated steel layer to provide welds proper fusion without impurities.
7. Preparation of surface: Surfaces to be welded shall be free of loose scale, slag, rust, grease, paint and any other foreign material.
8. Welding equipment: Welding equipment to be used in each case shall be acceptable to welding inspector. Use equipment with suitable devices to regulate speed and manually adjust operating amperage and voltage. The amperage capacity shall be sufficient to overcome line drop, and to give adequate welding heat.
9. Remove runoff tabs and grind surfaces smooth where the tabs would interfere with fireproofing and architectural finishes.
10. End-welded studs:

- a. Automatic end-welded studs: Automatically end-weld in accordance with the manufacturer's written recommendations in such a manner as to provide complete fusion between the end of the stud and the plates. There shall be no porosity or evidence of lack of fusion between the welded end of the stud and the plate. The stud shall decrease in length during welding approximately 1/8 inch for 5/8 inch, and 3/16 inch for 3/4 inch diameter. Stud sizes indicated on drawings represent the finish stud height.
 - b. Fillet-end welded studs: Studs may be welded using prequalified FCAW, GMAW, or SMAW processes provided the requirements of the AWS D1.1 Clause 7 "Stud Welding" are met as well as any other pertinent requirements of D1.1.
11. Provide mill camber as shown on the construction documents within AISC tolerance. Place mill tolerance upward for all beams specified no camber.
- J. Railing Systems (Guard Rails, Hand Rails, Stair Rails and Queuing Rails): Assemble railing systems in shop to the greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation. Use connections that maintain structural value of joined pieces.
1. Form changes in direction of railing members as follows:
 - a. By bending (unless otherwise indicated by the contract documents).
 2. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain profile of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
 3. Welded Connections: Fabricate railing systems and handrails for connecting members by welding. For connections made during fabrication, weld corners and seams continuously to comply with the following:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
 4. Nonwelded Connections: Fabricate railing systems and handrails by connecting members with railing manufacturer's standard concealed mechanical fasteners and fittings, unless otherwise indicated. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - a. Fabricate splice joints for field connection using epoxy structural adhesive where this represents manufacturer's standard splicing method.
 5. Brackets, Flanges, Fittings, and Anchors: Provide manufacturer's standard hand rail brackets, miscellaneous brackets, flanges, miscellaneous fittings, and anchors to connect handrail and railing members to other construction.
 6. Provide inserts and other anchorage devices to connect handrails and railing systems to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railing systems. Coordinate anchorage devices with supporting structure.
 7. For railing posts set in concrete, provide preset sleeves of steel not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, and steel plate forming bottom closure.

8. For removable railing posts, fabricate slip-fit sockets from steel tube whose inside diameter is sized for a close fit with posts and to limit deflection of post without lateral load, measured at top, to not more than 1/12 of post height. Provide socket covers designed and fabricated to resist being dislodged.
 - a. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.
9. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.
10. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to the smallest radius possible without causing grain separation or otherwise impairing work.
11. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.
12. Provide weep holes or another means to drain entrapped water in hollow sections of railing members that are exposed to exterior or to moisture from condensation or other sources.
13. Fabricate joints that will be exposed to weather in a watertight manner.
14. Close exposed ends of handrail and railing members with prefabricated end fittings.
15. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of the railing and wall is 1/4 inch or less.
16. Toe Boards: Where indicated, provide toe boards at railings around openings and at the edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.
17. Fillers: Provide steel sheet or plate fillers of thickness and size indicated or required to support structural loads of handrails where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thickness. Size fillers to produce adequate bearing to prevent bracket rotation and overstressing of substrate.

2.5 FINISHES

A. Shop Cleaning:

1. Clean all surfaces of steel. Remove all rust, mill scale, deposits of splatter, slag or flux, oil, dirt, and all other materials.
 - a. Use hand tool, power tool, sandblasting, chemical cleaning, and any other method necessary to provide a smooth, sound surface.
2. Clean contact surfaces of high strength bolt of all burrs and material, which might prevent solid seating of the parts. Steel to receive bolts shall be primer painted except beneath the contact area of slip-critical bolts.

B. Shop Priming:

1. General:
 - a. "Painting of structural steel shall comply with the requirements contained in AISC 360. Painting of open-web steel joist girders shall comply with the requirements of SJI CJ-1.0, SJI JG-1.1, SJI K-1.1 and SJI LH/DLH-1.1. Individual structural members and assembled panels of cold-formed steel construction shall be protected against corrosion in accordance with the requirements contained in AISI S100. Protection of cold-formed steel light-frame construction shall also comply with the requirements contained in AISI S200," per CBC Section 2203A.1.
 - b. Shop prime all steel except the following:
 - 1) Surfaces embedded in concrete, or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 - 2) Contact surfaces for slip-critical (sc) high strength bolts.

- 3) Surfaces within 2 inches of field welds.
 - 4) Top of structural support members when metal deck is welded to supports.
 - a) Primer is required when metal deck is mechanically attached to structural support members.
 - 5) Surfaces to receive sprayed-fire-resistive materials (applied fireproofing).
 - 6) Surfaces to be galvanized.
2. Priming:
- a. Immediately after surface preparation, apply primer according to manufacturer's written instructions and at a rate recommended by SSPC to provide minimum film thickness. Use priming methods that results in full coverage of joints, corners, edges and exposed surfaces.
 - 1) Strip paint corners, crevices, bolts, welds and sharp edges.
 - 2) Apply two shop prime coats to areas, which will be inaccessible after assembly or erection.
 - b. Provide PPG PAINTS field primers; or approved equivalent, in accordance with Specification Section - SUBSTITUTION PROCEDURES. Should the Contractor substitute another paint company other than "PPG PAINTS" in Specification Section - PAINTING, then coordination of steel primers with finish coats specified in Specification Section - PAINTING is the Contractor's responsibility.
 - c. Use the following shop painting systems on all normal environment interior steelwork:
 - 1) Surface Preparation: SSPC-SP2 "Hand Tool Cleaning" or SSPC-SP3 "Power Tool Cleaning."
 - 2) Application: Follow coating manufacturer's printed directions.
 - 3) Material: PPG PAINTS MULTI-PRIME 94-258 Primer.
 - 4) Number of Coats: One.
 - 5) Dry Film Thickness: 2.0 mils minimum.
 - 6) Volume Solids: 51.0 +/- 1.0% minimum.
 - 7) Generic Description: Modified Alkyd Resin Universal Primer.
 - d. Use the following shop painting systems on all exterior steelwork and interior steelwork subjected to wet conditions or fumes.
 - 1) Surface Preparation: SSPC-SP6 "Commercial Blast Cleaning."
 - 2) Application: Follow coating manufacturer's printed directions.
 - 3) Material: PPG PAINTS AMERCOAT 68HS Primer.
 - 4) Number of Coats: One.
 - 5) Dry Film Thickness: 5.0 mils minimum.
 - 6) Volume Solids: 78% +/-2%
 - 7) Generic Description: Reinforced Inorganic Zinc-Rich Urethane.
- C. Hot-Dip Galvanizing:
1. Zinc coatings on iron and steel products in accordance with ASTM A 123 "Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products."
 - a. Minimum thickness required shall be 3.9 mils.
 - b. All items that will be exposed to view (i.e. security fence, handrails, guard rails, awnings, canopies and shade structures left exposed to view), shall be Hot-Dipped Galvanized in accordance with ASTM A 385, "Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip)."
 2. Zinc coatings on iron and steel hardware shall be in accordance with ASTM A 153 "Standard Specifications for Zinc Coating (Hot-Dip) on Iron and Steel Hardware."

3. Galvanized repair paint: High-Zinc-Dust-Content, in accordance with SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight paint for re-galvanizing welds and repair painting galvanized steel.

D. Stainless Steel Finishes:

1. Remove tool and die marks and stretch lines or blend into finish.
2. Grind and polish to produce uniform, directionally textured, polished surfaces without cross-scratches. Run grain with long dimension of each piece.
3. Bright Directional Satin Finish No.4, unless otherwise shown on drawings.
4. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.6 SOURCE QUALITY CONTROL

A. Fabrication Tolerances:

1. "Architecturally Exposed Structural Steel", all steel for the Custom Steel Fabrications and miscellaneous "Metal Fabrications" that are subject to view are defined as "Exposed-to-View" joints. All joints that are "Exposed to View" shall be in accordance with AISC Code of Standard Practice, Section 10, "Architecturally Exposed Structural Steel."
 - a. All cope, miters and butt cuts in surfaces "Exposed-to-View" are made with uniform gaps of 1/8 inch if shown to be open joints, or in reasonable contact if shown without gap, in accordance with AISC Code of Standard Practice, Section 10.3.4.

B. Tests, Inspection:

1. In accordance with Specification Section – TESTING LABORATORY SERVICES and the following:
 - a. Materials shall be certified, identified and tested in conformance with CBC Table 1705A.2.1. Commercial stock steel shall be identified in accordance with CBC Table 1705A.2.1.
 - b. Complete four-sided inspection of all steel shall be made when required by Architect.
 - c. Tests and inspection of Shop and field welding in accordance with CBC Table 1705A.2.1. Perform shop and field welding only under supervision of welding inspector.
 - 1) Welds shall be in accordance with CBC Table 1705A.2.1.
 - 2) Inspection:
 - a) Welding inspector shall be an AWS Certified Welding Inspector (CWI).
 - d. Tests & Inspection for High Strength Bolts in accordance with CBC Table 1705A.2.1.
2. Testing Laboratory:
 - a. An inspection and testing laboratory will be selected by the Owner for testing and inspection as required by the Contract Documents. The selected laboratory shall conform to the requirements of ASTM E 329 "Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction." Documentary evidence of such conformance shall be submitted to the Owner and the Governing Agency.

- b. All materials, work, methods and equipment shall be subject to inspection at the mill, fabricating plant and at the building site. Material or workmanship not complying fully with the Contract Documents will not be accepted. The Contractor shall give the Testing Laboratory reasonable notice when ready for inspection and shall supply samples and test pieces and all facilities for inspection without extra charge. The Owner will assume the expense of making the tests and inspection except as otherwise specified in Division 1.
3. Cost of Testing and Inspection: Costs of testing and inspection of structural steel, except as specified hereunder and in Division 1, will be paid for by the Owner.
 - a. All transportation costs and per diem living costs for inspection at fabricator's plant further than 75 miles from the job site will be back-charged to the Contractor.
 - b. It is assumed that all fabrication will take place in one shop location only. All additional inspection costs will be back-charged to the Contractor.
 - c. All mill tests and costs or re-test of plain materials shall be at the expense of the Contractor.
 - d. Costs of tests required due to Contractor's failure to provide steel identifiable in accordance with the indicated ASTM designation shall be at the expense of the Contractor.
4. Structural Steel Testing and Inspection:
 - a. If structural steel tests are indicated as required on the structural drawings, one tension and one bend test shall be made for each size of structural shape, plate and for each tube and pipe size. Tests to be made in accordance with requirements of appropriate ASTM designations.
 - b. If structural steel tests are not indicated as required on the structural drawings, then for shapes, plates, bars, pipe and tubing, manufacturer's certified mill test reports and analysis for each heat will be acceptable for steel identifiable in accordance with indicated ASTM designation. Mill test reports shall indicate the physical and chemical properties of all structural steel used. Correlate individual heat numbers with each specified structural section.
 - c. Unidentifiable Steel:
 - 1) For F_y less than or equal to 36.0 ksi: Provide one tension and elongation test and one bend for each 5 tons or fraction thereof for each size.
 - 2) For F_y greater than 36.0 ksi: Provide one tension and elongation test and one bend or flattening for each piece.
 - d. Costs of re-tests and additional testing required by the use of unidentifiable steels shall be the Contractor's responsibility. Additional costs of testing incurred by the Owner shall be deducted from the Contract Final Payment.
5. Expansion Anchors: Load test as indicated on the drawings.
6. Welding Inspection:
 - a. If shop or field welding inspection is indicated on the structural drawings, all shop and field welded operations shall be inspected by a qualified welding inspector employed by the Testing Laboratory. Such Inspector shall be a person trained and thoroughly experienced in inspection of welds. The inspector's ability to distinguish between sound and unsound welding will be reliably established.
 - b. The Welding Inspector shall make a systematic record of all welds. This record shall include:
 - 1) Identification marks of welders.
 - 2) List of defective welds.
 - 3) Manner of correction of defects.

- c. The welding inspector shall check the material, equipment and procedure, as well as the welds. He/she shall also check the ability of the welder. He/she shall furnish the Architect with a report, duly verified by him/her that the welding which is required to be inspected is proper, and has been done in conformity with the Contract Documents, and that he/she has used all means to determine the quality of the welds.
 - d. All full penetration groove welds shall be subject to ultrasonic testing, as per AWS D1.1, Clause 6 "Inspection, Part "C", Ultrasonic Testing of Groove Welds." All defective welds shall be repaired and re-tested with ultrasonic equipment at the Contractor's expense.
 - e. Column Flanges: An area extending 6 inches above and below point where girder flanges area attached shall be inspected. Column flange edges shall be inspected visually, and entire area ultrasonically for lamination, plate discontinuities, and non-metallic inclusions.
 - f. All partial penetration groove welds shall be tested by ultrasonic testing.
 - g. When ultrasonic indications arising from the weld root be interpreted as either a weld defect or the backing strip itself, the Engineer shall be notified. The Engineer may require the removal of backing strip. The backing strip shall be removed at the expense of the Contractor, and if no root defects are visible the weld shall be re-tested. If no defect is indicated on this re-test, and no significant amount of base and weld metal have been removed, no further repair of welding is necessary. If a defect is indicated, it shall be repaired and re-tested at the Contractor's expense.
 - h. The ultrasonic instrumentation will be calibrated by the technician to evaluate the quality of the welds in accordance with AWS D1.1.
 - i. Other methods of inspection, for example, X-ray, gamma ray, magnetic particle, or dye penetrant, may be used on welds if felt necessary by the inspection laboratory, and with the approval of the Engineer.
 - j. 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 weld before and after joint completion.
 - k. End-welded studs shall be sampled, tested, and inspected per the requirements of the Structural Welding Code – Steel D1.1, published by the American Welding Society.
 - l. At the discretion of the Owner's testing agency, the ultrasonic testing frequency may be reduced but may not be less than the following:
 - 1) Initially, all welds requiring ultrasonic testing will be tested at the rate of 100 percent in order to establish the qualifications of each individual welder. If the reject rate is demonstrated to be less than 5 percent of the welds tested for each welder, then the frequency of testing for that welder may be reduced to 25 percent. If the reject rate increases to 5 percent or more, 100 percent testing will be re-established until the rate is reduced to less than 5 percent. The percentage of rejects will be calculated for each welder independently.
 - m. A sampling of at least 40 completed welds will be made for such reduction evaluation. Reject rate is defined as the number of welds containing rejected defects divided by the number of welds completed. For evaluating the reject rate of continuous welds over 3' in length, each 12 linear inch increment of welds, 1 inch or less in thickness, will be considered as one weld. For evaluating the reject rate of continuous welds greater than 1 inch thickness, each 6 linear inches will be considered one weld.
7. High Strength Bolting Tests and Inspection:

- a. Furnish certified test reports for each lot of bolts in accordance with Section 9 of ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength." Install bolts under the supervision of a qualified inspector in accordance with Section 9, Research Council "Specifications for Structural Joints using bolts for ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength."
- b. If high strength bolting inspection is indicated or required on the structural drawings, the testing laboratory will visually inspect all high strength bolts.
- c. While the work is in progress, the Project Inspector shall determine that the requirements of this Specification are met in the work. The Project Inspector shall observe the calibration procedures and shall monitor the installation of bolts to determine that all plies of connected material have been drawn together and that the selected procedure is properly used to tighten all bolts.
 - 1) In addition to the requirement of the foregoing paragraph, for all connections specified to be slip critical (SC), the Project Inspector shall assure that the specified procedure was followed to achieve the pretension specified in the AISC. The pre-tension shall be verified by the Project Inspector for these bolts.
 - 2) Bolts in connections identified as not being slip-critical nor subject to direct tension need not be inspected for bolt tension other than to ensure that the piles of the connected elements have been brought into snug contact.

C. Verification of Performance:

1. Testing Agent shall be a qualified person or Testing Laboratory listed and approved by DSA/SSS and selected by the Architect, and the Owner.
2. Testing Agent shall make Test and Inspection Reports certifying materials and workmanship to conform with Drawings and Specifications.
 - a. Cost of Testing and Inspection will be paid by Owner unless otherwise specified.
 - b. Cost of cutting and machining test samples shall be paid by Contractor.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. 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.
 - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

- A. Employ a licensed land surveyor for accurate erection of structural steel.
 - 1. Check elevations of bearing surfaces (concrete or masonry), and locations of anchor bolts and similar devices, before erection work proceeds.
 - 2. Report discrepancies to Architect.
 - 3. Do not proceed with erection until corrections have been made or until compensating adjustments to structural steel work have been agreed upon with the Architect.
- B. Erect all Structural Steel frame work in accordance with AISC Specifications "Specification for the Design, Fabrication and Erection of Structural Steel for Building," latest edition, and AISC Code unless otherwise indicated on Drawings or Specification.
 - 1. Framing: Carry up framing true and plumb. Provide temporary bracing wherever necessary to support all loads to which the structure may be subjected, including erection equipment and its operation. Leave bracing in place as long as may be required for safety. As erection progresses securely connect the work to take care of all dead load, wind and erection stresses.
 - 2. Connections:
 - a. Machine Bolts shall be installed with cut washer under nut.
 - b. High Strength Bolts shall be used to assemble structural joints in accordance with AISC "Specification for Structural Joints using bolts for ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength," unless otherwise indicated on the drawings.
 - 1) Tighten nuts for Bolts in accordance with CBC Sections 1705A.2.1. Load Indicating Devices shall be pre-approved by the DSA/SSS, and certification by an independent testing laboratory stating that the devices meet AISC Specifications shall be submitted to Project Engineer and DSA/SSS.
 - 2) Manufacturer shall also submit installation procedures prior to incorporation into the work for approval by the Project Engineer.
 - 3) Once approved, manufacturer's installation instructions shall be followed for all conditions. Mark bolts that have been completely tightened with an identifying symbol.
 - 4) Connections shall be slip-critical (SC) type.

- a) Slip-critical connections, surfaces shall be in accordance with AISC "Specification for Structural Joints Using bolts for ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength."
- 5) Contacting surfaces shall be painted, except for friction-type (SC) connections.
- 6) Provide washers in accordance with ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength."
- c. Welding: The details of all joints, the technique of welding employed, the appearance and quality of welds made, and the methods used in correcting defective work shall conform to "AISC Specs," "AWS Code," Table 1705A.2.1.
 - 1) All "exposed-to-view" welds will be smooth and flush with no voids showing and still be in conformance with standards referenced herein.
 - 2) All exposed to view butt welds shall be flush as connected members will allow. Minor defects and transitions in metal surfaces shall be filled and sanded out with an approved metal filler prior to painting.
 - 3) Exposed fillet welds are acceptable "as is" provided the surface chevrons are shallow and have no abrupt protrusions.
3. Cutting Holes: The use of a cutting torch is permissible only if the metal being cut is not carrying stress during the operation and only with the prior approval of the Architect and DSA/SSS for each specific condition.
4. Setting Plates: Set column base plates and leveling plates to correct elevations and temporarily support on steel wedges or shims until the supported members have been plumbed, locked in place and grouted.
- C. Erection Sequence: Erect steel in accordance with special erection sequences where special erection sequences are indicated on the contract documents.
- D. Before and during erection, keep all structural steel clean. Ship, handle and store steel in a manner to avoid injury to members. Steel members showing evidence to rough handling or injury will be rejected.
- E. Mark each member with erection identification corresponding to mark shown on erection drawings. Carefully plan erection of structural steel so that no cutting and removal of material will be necessary. Do not torch burn in the field, unless specifically permitted by Engineer.
- F. Provide sufficient bracing, shoring and guys to effect safe and satisfactory erection. Provide bracing and shoring capable of holding steel work plumb and properly aligned while field connections are being made, and until lateral force resisting elements are deemed by the Architect to be capable of bracing structure. Temporary bracing shall be adequate to resist lateral forces from wind or seismic prior to the completion of the lateral resisting system.
- G. Set bearing and base plates with extreme care. Bring level, to line and grade with leveling plates or by leveling nuts and bolts. Grout solid under plates with a flowable non-shrink grout per Specification Section – CAST-IN-PLACE CONCRETE prior to applying vertical load.

- H. Field Assembly: Set structural framing accurately to the lines and elevations indicated. Align and adjust the various members forming a part of a complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces which will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
1. Shimming or other adjustments not indicated on drawings shall be approved by the Engineer prior to installation. Level and plumb individual members of the structure within specified AISC tolerances except as noted herein. Column shimming shall be 1/4 inch.
- I. All welds shall be full and clean, and conform to AISC and AWS Specifications.
- J. Erection Tolerances: Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
1. Individual pieces shall be erected so that the deviation from plumb, level and alignment shall not exceed 1 to 500 plus:
 2. The maximum displacement of the center-line of columns adjacent to elevator shafts, from the established column line, shall not be more than 1 inch at any point from the established column line in the first 20 stories.
 3. In order to provide a true, flat plane for the exterior elevations, install all steel framing at the exterior walls of the building, so that the center lines of such framing does not vary by more than 1 inch for the length of the building.
 - a. Also, install each vertical member on such grids so that its vertical center-line does not vary by more than 1/2 inch from a vertical line for each story and 1 inch for its full height.
 4. Take special care that column base plates are parallel and perpendicular to faces of columns and that bolt holes are accurately placed.
- K. Hoisting And Bracing:
1. Provide all hoisting and erecting equipment and power.
 2. Provide and maintain any and all safety railings, toe boards, etc., required for the erection of steel framing and metal decking.
 3. Brace the erected frame in a manner which will assure safety and proper alignment to receive the metal decking and until the concrete slabs have been poured and have set.
 4. Erect building frame true and level. Erect columns in a manner to allow for movement due to welding shrinkage and thermal expansion and contraction of framing. Check for plumb after erection of each level. Maintain structural stability of frame during erection. Provide temporary bracing where necessary to maintain frame stability and to support required loads, including equipment and its operation.

3.4 CONSTRUCTION

- A. Special Techniques:
1. Architecturally Exposed Structural Steel and "Exposed to View" Metal Fabrications.
 - a. At all exposed joints, continuous fill with Plastic Steel Putty. Sand smooth and uniform and ready to receive finishes.
 - 1) Clean all areas to have smooth seams with manufacturers recommended cleaner.
 - 2) Place Steel Putty and cure.

3.5 REPAIR / RESTORATION

- A. Defective Work shall be immediately replaced with proper work. Such replaced Work and the Testing and Inspection for it shall be at the expense of the Contractor. If defects or damages cannot be corrected in the field, the material shall be returned to the shop or new parts furnished, as the Architect directs, and the Contractor shall pay all costs therefor.
1. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780 "Practice for Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings."
 2. Primer Coat - On all hot-dip iron or steel that needs repair, provide one primer coat of the following:
 - a. Zinc Rich Galvanize No. 1141 by AERVOE INDUSTRIES, INC., or approved equivalent.
 - b. Provide a smooth-flowing, high-solids compound that provides a fast-drying coating that protects ferrous metals in highly corrosive environments. Coating shall be 97% pure zinc metallic flake, which leaves 94% zinc in the dry film.
 - c. Overall Dry Film Thickness: 2.0 mil.
 3. Finish Coat - On all hot-dip iron or steel that needs repair, provide one finish coat over a properly cured primer coat of the following:
 - a. Zinc Rich Galvanize No. 1141 by AERVOE INDUSTRIES, INC., or approved equivalent.
 - b. Provide a smooth-flowing, high-solids compound that provides a fast-drying coating that protects ferrous metals in highly corrosive environments. Coating shall be 97% pure zinc metallic flake, which leaves 94% zinc in the dry film.
 - c. Overall Dry Film Thickness: 2.0 mil.
- B. Touch-up Primer Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop priming to comply with SSPC-PA1 "Touching Up Shop-Painted Surfaces."
1. Clean and prepare surfaces by SSPC-SP 2 "Hand-Tool Cleaning" or SSPC-SP 3 "Power-Tool Cleaning."

3.6 FIELD QUALITY CONTROL

- A. Site Tests:
1. As required by Regulatory Requirements.
- B. Tests, inspection:
1. As required by Regulatory Requirements.
 2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
 3. No work shall be without the inspections required by Regulatory Requirements.
 4. Tests and inspection of field welding in accordance with CBC Table 1705A.2.1. Perform field welding only under supervision of welding inspector.
 - a. Welds shall be in accordance with CBC Table 1705A.2.1.
 - b. Inspection shall be in accordance with CBC Table 1705A.2.1.
 - 1) Welding inspector shall be an AWS Certified Welding Inspector (CWI).
- C. Verification of Performance:

1. Certification:
 - a. The Contractor shall engage and pay for a registered Civil Engineer or Licensed Land Surveyor to check the alignment, plumbness, elevation, and overall accuracy of the erected framing at appropriate stages during construction and at completion of erection.
 - b. Civil Engineer or Licensed Land Surveyor shall submit written verification and certification that the entire installation is in accordance with the Contract Documents.

3.7 SCHEDULES

- A. Metal Fabrication Schedule should be used as a guide only and is not considered as a complete list. Refer to Drawings for location and details:
 1. Miscellaneous backing members, brackets, and supports for work installed by other trades.
 2. Countertop Bracket
 3. Fence
 4. Gates and Frames
 5. Ladder
 6. Lintels
 7. Sunscreen
 8. Removable Bollard
 9. Guard Rail
 10. Hand Rail
 11. Handrail Bracket
 12. Stair Rail
 13. Queuing Rail
 14. Stairs
 15. Fixed Bollard
 16. Canopy
 17. Down Spouts

END OF SECTION

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SECTION 053000 – METAL DECK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install all Metal Deck materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 03 15 14 DRILLED ANCHORS
 4. 03 30 00 CAST-IN-PLACE CONCRETE
 5. 04 22 00 CONCRETE MASONRY UNITS
 6. 05 12 00 STEEL AND FABRICATIONS
 7. 06 10 00 ROUGH CARPENTRY
 8. 07 14 16 FLUID-APPLIED WATERPROOFING
 9. 07 21 00 INSULATION
 10. 07 53 29 ELASTOMERIC MEMBRANE ROOFING
 11. 07 60 00 SHEET METAL
 12. 07 72 00 ROOF ACCESSORIES
 13. 07 92 00 SEALANTS
 14. 09 22 16 METAL FRAMING
 15. 09 50 00 ACOUSTICAL CEILINGS
 16. 09 91 00 PAINTING
 17. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 18. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. Standards:
1. In accordance with Specification Section – REGULATORY REQUIREMENTS and the following standards:
 - a. AISC American Institute of Steel Construction.
 - b. AISI American Iron and Steel Institute.
 - c. ASTM American Society for Testing and Materials.
 - d. AWS American Welding Society "Structural Welding Code."
 - e. DOD Department of Defense
 - f. ICC International Code Council
 - g. SDI Steel Deck Institute.
 - h. SSPC The Society for Protective Coatings

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data.
 - a. Include all accessories such as Metal Trim, Flute Closure Trim, Neoprene Closure Tape, Joint Covers, and Sound Insulation Batts (sized to fit flute profile).
 2. Shop Drawings:
 - a. Indicate deck sheet layout and all installation details. Contract documents may not be used as shop drawings.
 - b. Manufacturer's specifications for each Deck Type.
 - c. Certification: Provide affidavits from the manufacturer listing mill test certificates by number for each size and type of decking.
 - d. Manufacturer shall provide affidavits of approval by the International Code Council (ICC) for the metal decking shapes proposed.
 3. Quality Assurance/Control Submittals:
 - a. Design Data.
 - 1) Submit manufacturer's design data indicating Metal Panel Section Properties (including gage, weight in pounds per ft², I+ and I-(in⁴/ft), S+ and S-(in³/ft), and profile dimensions).
 - b. Test Reports:
 - 1) Submit Steel Mill Test Reports for each heat establishing conformity with these Specifications in accordance with CBC Section 2202A.
 - 2) Submit five (5) copies of Shop and Field Welding Tests and Inspection Reports.
 4. Closeout Submittals in accordance with Specification Sections in Division One:
 - a. Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.

1.4 QUALITY ASSURANCE

- A. Qualifications:
1. Material Qualifications:
 - a. Materials shall be identified and tested in conformance with CBC Section 2202A.
 2. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - b. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
 3. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
- B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:

- a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
- b. Tests and Inspection of Shop and field welding shall be in accordance with CBC Sections 1705A.2, 2204A.1 and 2213A.2.
 - 1) Perform shop and field welding only under supervision of an AWS/CWI inspector, by welders recently qualified by Test as prescribed in AWS "Standard Qualifications Procedure," and per CBC Section 2205A and 2213A.
- c. When Metal Decking is part of a "listed" deck assembly as indicated on the drawings, provide Metal Decking units listed in Underwriter's Laboratories (UL) "Fire Resistive Directory," or other approved "Fire Resistive Directory," with each deck unit bearing the fire resistive label and marking for specific system detailed.

C. Certificates:

- 1. Provide a letter on Contractor's Letterhead certifying Work provided, meets or exceeds, the requirements of this Section.

1.5 SCHEDULING

- A. Schedule the Work so that there will be no excessive inspection time. At all times that an inspector is required, sufficient work shall be laid out and adequate personnel supplied so that the Inspector's time will be used to full advantage. If inspection costs become excessive because of poor shop procedure, such excess costs will be paid for by the Owner, but deducted from the Contract Price. Poor procedures will be determined upon review of Inspection and/or Testing Reports. The rate for charging the excess costs will be as follows:
 - 1. Minimum of three (3) certified welders are used, Owner will pay 100 percent.
 - 2. Only two (2) certified welders are used, Contractor will be charged 1/3 of the Inspection cost.
 - 3. Only one (1) certified welder is used, the Contractor will be charged 2/3 of the inspection cost.

1.6 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section - WARRANTIES
 - a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified product manufacturer:
 - a. VERCO MANUFACTURING COMPANY.
 - b. Acceptable alternative manufacturers:
 - 1) ASC PROFILES.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Structural:
1. Steel for galvanized Metal Deck Units shall be in accordance with ASTM A 653 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process," grade as indicated on the drawings and in compliance with SDI specifications. The steel sheets shall have received, before being formed, a metal protective coating of Zinc conforming to ASTM A653 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process" Class G60 coating.
 2. Provide deck sections, type and gage as indicated on the drawings. Other manufacturers producing deck complying with these Specifications, and having equivalent properties and dimensions will be subject to the Architect's review upon submission of substantiating data, and may be used only if equivalent to deck sections specified, in the Architect's opinion.
 3. All deck units shall have an International Code Council (ICC) Evaluation Services Report.
 - a. Diaphragm shear capacities shall be comparable (within 5%) to those listed on the drawings for the deck, welding, and spans indicated.
 4. Units shall be in lengths to span over three or more supports. Where steel layout does not permit two-span minimums, notify the Structural Engineer prior to fabrication.
 5. For limitations of loads to metal decking see calculations.
 6. All deck units shall have male and female interlocking side joints. All deck units with concrete or insulating concrete shall be vented to provide 1% open area.
 7. Prior to covering or filling metal decking, verify and coordinate installation requirements of suspended metal framing, suspended acoustical ceiling systems, mechanical and electrical work or other items as required. Provide inserts, clips, anchors or fasteners as indicated or as otherwise required to provide for the complete and proper installation of suspended items from the metal deck.

- a. Coordinate with Specification Section - ACOUSTICAL CEILINGS.
 - b. Verify and coordinate locations, patterns, spacing, etc. of suspension members and connectors required by other Sections of the Specifications.
 - c. Where suspension or hanger wires are required under other Sections, verify and coordinate locations, patterns, spacing, etc. with the appropriate trade. No loading other than suspended ceilings may be suspended from metal deck without concrete fill. Suspend all piping, ducting, conduit and equipment from steel beams.
8. Structural Properties: Deck shall have minimum structural properties as indicated on Structural Drawings.
9. Acoustical Properties: When Acoustical Decks are required, provide acoustical deck with the following properties:
- a. Vertical webs (except at side joint) shall be perforated with 5/32" diameter holes on staggered 7/16" centers to provide 0.85 Noise Reduction Coefficient (NRC). NRC of completed assembly shall be as determined by tests in accordance with ASTM C 423 "Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method."

2.3 ACCESSORIES

- A. Miscellaneous Steel Shapes:
1. Provide in accordance with Specification Section – STEEL AND FABRICATIONS, and ASTM A 36.
- B. Shear Connectors:
1. Headed stud type, in accordance with ASTM A 108 "Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality," Grade 1015 or 1020, cold-finished carbon steel, with dimensions complying with AISC specifications.
 - a. Tensile Strength: 60,000 psi.
 - b. Elongation in 2 Inches: 20 percent.
 - c. Reduction of Area: 50 percent.
- C. Fabricated Sheet Metal:
1. Provide in accordance with Specification Section - SHEET METAL and ASTM A 653, commercial quality, galvanized.
 - a. Cell closures where shown on Drawings.
 - b. Light gage plate fillers attached to deck to provide an uninterrupted roof plane.
 - c. Drain sumps and/or roof drain mounting plates as detailed.
 - d. Cell end closures column flashing and miscellaneous closures to prevent concrete leakage.
 - e. Miscellaneous accessories incidental to erection of deck.
- D. Acoustical Insulation: Glass fiber type, 1-1/2" thick, in accordance with ASTM C 665 "Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing," Type I, Class A, sized to fit the appropriate flute profile.
- E. Welding Rods: E70XX minimum.

2.4 FABRICATION

A. Shop Assembly:

1. Form metal deck units in lengths to span three or more supports, with flush, telescoped, or nested 2-inch laps at ends and interlocking or nested side laps, of metal thickness, depth, and width as indicated.
 - a. Roof Deck Units:
 - 1) Provide deck configurations that comply with SDI "Specifications and Commentary for Steel Roof Deck."
2. Accessories:
 - a. Metal Cover Plates:
 - 1) Fabricate metal cover plates for end-abutting floor deck units of not less than same thickness as decking.
 - 2) Form to match contour of deck units and approximately 6-inches wide.
 - b. Metal Closure Strips:
 - 1) Fabricate metal closure strips, for cell raceways and openings between decking and other construction, of not less than 0.045-inch (18 gage) sheet steel.
 - 2) Form to provide tight-fitting closures at open ends of cells or flutes and sides of decking.
 - 3) Continuous closures parallel and over beam flanges are not allowed.
 - 4) Fabricate Profiled Metal Closure Strips for exposed "top of wall" connections and similar conditions where flutes are to be closed to view on underside of deck.
 - c. Roof Sump Pans:
 - 1) Fabricate from single piece of 0.071-inch (14 gage) minimum galvanized sheet steel with level bottoms and sloping sides to direct water flow to drain.
 - 2) Provide sump pans of adequate size to receive roof drains and with bearing flanges not less than 3-inches wide.
 - 3) Recess pans not less than 1-1/2 inches below roof deck surface unless otherwise shown or required by deck configuration.
 - 4) Holes for drains shall be cut in the field.

2.5 FINISHES

A. Hot-Dip Galvanizing (both sides of metal deck):

1. Zinc coatings on iron and steel products in accordance with ASTM A 123 "Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products."
2. Zinc coatings on iron and steel hardware shall be in accordance with ASTM A 153 "Standard Specifications for Zinc Coating (Hot-Dip) on Iron and Steel Hardware."
3. Galvanized repair paint: High-Zinc-Dust-Content, in accordance with SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight paint for re-galvanizing welds and repair painting galvanized steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions:

1. Prior to the execution of the Work under this specification section, inspect the installed Work executed under other specification sections of this Project Manual which affect the execution of Work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin Work until unacceptable conditions have been corrected.
3. Execution of Work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:

1. Coordinate Work under this specification section with Work specified under other specification sections to ensure proper and adequate interface of Metal Decking Work specified under this specification section.

B. Protection:

1. Protect all adjacent surfaces from drips, spray, welding burns, and other damage from Work under this specification section.

C. Surface preparation:

1. Prepare surface of metal decking for any additional finish as indicated on the drawings in accordance with manufacturer's written instructions and recommendations.

3.3 INSTALLATION

A. General:

1. In accordance with Regulatory Requirements.
2. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
3. In accordance with approved shop drawings.
4. Set plumb, level, and square to supports.

B. Layout:

1. Lines shall be straight and true without deformations, creases, wrinkles or noticeable defects.
2. Provide one deck unit continuous over three (3) supports, minimum, unless noted otherwise.
3. Abut end joints neatly at centerline of support.
4. Bend decking to conform to slopes and warps as required for solid contact to framing that allows proper welding.

5. Shoring for metal decking shall be provided by the contractor as required and as indicated in the corresponding ICC Evaluation Services Report. Coordinate shoring requirements for construction live load (and concrete placement) with the manufacturer.
 6. All deck units shall break over beams.
 7. Provide low ribs at all beams parallel to deck. As an alternate, the deck may be broken and in-filled with a flat pan to provide deck welding to parallel beams.
 8. Butt deck units tight over steel beams.
 9. Provide 3/4" clear concrete cover around all welded studs.
- C. Minimum Fastening Requirements:
1. Fasten in accordance with the structural drawings and/or manufacturer's written recommendations whichever is most restrictive by use of 15/16" visible diameter (1/2" effective diameter) fusion welds.
 2. Roof Deck units shall be fastened to resist gross uplift loading in accordance with CBC Section 1609A with a minimum of 39 lbs./ft² for roof areas.
 3. The metal deck shall be fastened to all structural members both parallel and perpendicular. Spread deck and modify layout where structural members are parallel to the metal deck ribs.
- D. Cutting and Fitting:
1. Cut and neatly fit deck units and accessories around other Work projecting through or adjacent to the decking, and support of other Work shown.
 2. Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other Work shown.
 3. Provide DSA/SSS approved hanger slots or clips between cells of flutes of lower element where floor deck units are to receive hangers for support of ceiling construction, air ducts, diffusers, or lighting fixtures.
 - a. Hanger clips designed to clip over male side lap joints of floor deck units that are approved by DSA/SSS may be used instead of hanger slots.
 - b. Local slots or clips at no more than 14-inches o.c. in both directions, not over 8-inches form walls at ends, and not more than 8-inches form walls at sides, unless otherwise indicated on the drawings.
 - c. Provide manufacturer's standard hanger attachment devices provided they are in accordance with IR 25-2.13 or IR 25-3, and approved by DSA/SSS.
- E. Provide metal joint covers at abutting ends and changes in direction of floor deck units, except where taped joints are required.
- F. Provide roof sump pans over openings provided in roof decking and weld to top decking surface. Space welds not more than 12-inches o.c. with at least one weld at each corner.
- G. Weld shear connectors to supports through decking units as shown on the structural drawings.
1. Do not weld shear connectors through two layers (lapped ends) of decking units.
 2. Weld only on clean, dry deck surfaces.
- H. Provide metal closure strips at open uncovered ends and edges of roof decking and in voids between decking and other construction.
1. Weld into position to provide a complete decking installation.
 2. Continuous closure perpendicular to flutes not allowed.

3.4 REPAIR / RESTORATION

- A. After decking installation, wire brush, clean, and paint scarred areas, welds, and rust spots on top and bottom surfaces of decking units and supporting steel members in accordance with ASTM A 780 "Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings."
1. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's written instructions.
 2. Touch-up painted surfaces with same type of shop paint used on adjacent surfaces.
 3. In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.
 4. Clean surfaces of installed deck by effective means to receive sprayed-on fireproofing or finish painting as indicated.

3.5 FIELD QUALITY CONTROL

- A. Site Tests:
1. As required by Regulatory Requirements.
 - a. Inspection of installation as per Specification Section – TESTING LABORATORY SERVICES.
- B. Inspection:
1. As required by Regulatory Requirements.
 2. Schedule inspections and notify the Architect, Owner's Inspector and any regulatory agencies of the time at least 48 hours prior to the inspection.
 3. No Work shall be without the inspections required by Regulatory Requirements.
 4. All materials, methods and equipment shall be subject to inspections by the Testing Laboratory at any time.
 5. Welding Inspection: Welding of metal deck shall be performed under the inspection of the Testing Laboratory. Inspection shall conform to CBC Section 2213A.
 6. Examine areas to receive work specified. Do not begin work until underlying work is complete, all required inspections have been made, and all conditions, which might prevent proper installation or impair performance of work have been corrected.
 7. Beginning installation means accepting conditions of underlying work.
 8. If supporting steel work is not properly aligned or sufficiently level to permit proper bearing of metal decking, such deficiency shall be corrected by the Contractor before placing units.
- C. Defective Deck:
1. Units of decking that become deformed or damaged to such extent that they are weakened or unsuitable for use shall be removed and replaced at no cost to the Owner.

3.6 CLEANING

- A. Cleaning:
1. Clean in accordance with Specification - PROJECT CLOSEOUT.
 - a. Clean all surfaces of Metal Deck to receive concrete fill as required to assure adequate bond in accordance with manufacturers requirements.

- b. Clean all surfaces of Metal Deck prior to painting.

END OF SECTION

SECTION 061000 – ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to complete all rough carpentry, accessories and other related items necessary to complete the Project as indicated by the Construction Documents unless specifically excluded.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 03 11 01 CONCRETE FORMWORK
 4. 03 15 14 DRILLED ANCHORS
 5. 03 30 00 CAST-IN-PLACE CONCRETE
 6. 04 22 00 CONCRETE MASONRY UNITS
 7. 05 12 00 STEEL AND FABRICATIONS
 8. 05 30 00 METAL DECK
 9. 06 41 23 MODULAR CASEWORK
 10. 07 21 00 INSULATION
 11. 07 53 29 ELASTOMERIC MEMBRANE ROOFING
 12. 07 60 00 SHEET METAL
 13. 07 72 00 ROOF ACCESSORIES
 14. 07 92 00 SEALANTS
 15. 08 31 13 ACCESS DOORS AND FRAMES
 16. 08 33 00 COILING DOORS
 17. 08 70 00 HARDWARE
 18. 09 22 16 METAL FRAMING
 19. 09 24 00 CEMENT PLASTER
 20. 09 29 00 GYPSUM BOARD
 21. 09 30 00 TILE
 22. 09 50 00 ACOUSTICAL CEILINGS
 23. 09 65 10 RESILIENT BASE AND ACCESSORIES
 24. 10 05 00 MISCELLANEOUS SPECIALTIES
 25. 10 11 00 VISUAL DISPLAY BOARDS
 26. 10 14 00 IDENTIFYING DEVICES
 27. 10 21 13 TOILET PARTITIONS
 28. 10 28 13 TOILET ACCESSORIES
 29. 10 44 00 FIRE PROTECTION SPECIALTIES
 30. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 31. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. Standards:

1. In accordance with the following standards:
 - a. ALSC American Lumber Standards Committee
 - b. ANSI American National Standards Institute
 - c. APA The Engineered Wood Association (Formerly the American Plywood Association)
 - d. ASME American Society of Mechanical Engineers International
 - e. AWWA American Wood Protection Association
 - f. CABO Council of American Building Officials
 - g. FS Federal Specification
 - h. ICC International Code Council
 - i. NDS National Design Specification for Wood Construction
 - j. NIST National Institute of Standards and Technology
 - k. PS Product Standards of the U.S. Department of Commerce
 - l. RIS Redwood Inspection Service
 - m. WCLIB West Coast Lumber Inspection Bureau
 - n. WWPA Western Wood Products Association

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 1. Product Data:
 - a. Submit manufacturer's data for Wood-Preservative Treatment.
 - b. Submit manufacturer's data for Fire-Retardant Treatment.
 - c. Submit manufacturer's data for power driven fasteners, metal-framing connectors, and metal framing anchors.
 2. Quality Assurance/Control Submittals:
 - a. Material Certificates: Submit Material Certificates of Compliance to Standards and Regulatory Requirements.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
- B. Regulatory Requirements:
 1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
- C. Meetings:
 1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
 2. Progress: Scheduled by the Contractor during the performance of the work.

- a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
- a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver undamaged products to project site in manufacturer's sealed containers or bundles with tags and labels intact.
- B. Storage and Protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 2. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.6 PROJECT CONDITIONS

- A. Environmental Requirements:
1. Dust Control: Perform work in a manner as to minimize the spread of dust and flying particles.
 2. Burning: No burning will be allowed on-site.
 3. Rain: Work under this section shall not be started or maintained under threat of rain unless the work is not affected by the rain.
- B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.7 WARRANTY

- A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES
 - a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Power Driven Fastener specified product manufacturer:
 - a. HILTI FASTENING SYSTEMS.
 - 2. Metal Framing Anchor specified product manufacturer:
 - a. SIMPSON STRONG-TIE COMPANY.
 - b. Acceptable alternative manufacturers:
 - 1) Manufacturers of Alternative Metal Framing Anchors shall have Model Code Research Evaluation Reports and Published allowable design loads that are determined from empirical data, or by rational engineering analysis, that are demonstrated by comprehensive testing performed by a qualified testing agency acceptable by the Architect or its Designated Design Consultant, and DSA.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Wood:
 - 1. Douglas Fir - Larch:
 - a. Standards and Requirements: In accordance with WCLIB "Standard Grading and Dressing Rules" No. 17, latest edition, and WWPA "Western Lumber Grading Rules• ," latest edition.
 - 1) All wood shall be "DRY" and having a moisture content of less than 19 percent at the time of installation, in accordance with WWPA.
 - 2) Provide wood of S4S unless otherwise noted.
 - 3) Factory mark each piece of wood with the grade stamp of the grading agency.
 - b. Grading and Use Requirements:

Item	Sizes	Grade	Maximum Moisture Content at Initial Use (Installation)
Studs	2x	No. 1	19%
Studs	3x, 4x, 6x	No. 1	19%
Sills & Plates	2x	No. 1	19%
Sills & Plates	3x, 4x, 6x	No. 1	19%
Beams	4x, 6x	No. 1	19%

Item	Sizes	Grade	Maximum Moisture Content at Initial Use (Installation)
Joists	2x	No. 1	19%
Posts	4x, 6x, 8x	No. 1	19%
Ledgers	2x	No. 1	19%
Ledgers	3x, 4x, 6x	No. 1	19%
Blocking	2x, 3x, 4x, 6x	No. 1	19%
Sheathing and Stripping	Up to 1-1/2" thick 2" width and wider	No. 1n	19%
Stripping	2x, 3x, 4x, 6x	Construction	19%
Nailers & Grounds	2x, 3x, 4x, 6x	Construction	19%
Furring	2x, 3x, 4x, 6x	Construction	19%
T & G Decking	2x	Select Dex	15%

- 1) Initial use shall be that point at which screws or other fasteners or the holes for said fasteners are installed into the wood.
- 2) The Contractor shall use whatever means necessary, including site drying to ensure that the moisture contents listed above are not exceeded.

B. Plywood:

1. Soft Plywood:

- a. Standards and Requirements: In accordance with PS1-09, Group 1 Douglas-Fir and PS2-10.
 - 1) Factory mark each piece of plywood with the APA Grade Stamp.
 - 2) Maximum Moisture Content at Initial Use (Installation) shall be 15 percent.
- b. Grading and Use Requirements:
 - 1) Wall, Roof, and Parapet Sheathing:
 - a) APA Rated Sheathing - Structural 1.
 - b) Span Rating as required to suit stud or joist spacing.
 - c) Exposure Durability Classification - Exposure 1.
 - d) Species Group 1.
 - e) Grade C-C 3 ply for 1/4 inch thickness and C-D 5 ply for 1/2 and 5/8 inch thickness.
 - 2) Backing panels:
 - a) APA Rated Sheathing - Structural 2.
 - b) Exposure Durability Classification - Exterior.
 - c) Species Group 1.
 - d) Grade A-B.
 - e) Shall be 3/4 inch minimum thickness.

2.3 FINISHES

A. Preservative Treatment:

1. Pressure Treat Wood and Plywood, with CARB Complying, EPA Registered, preservatives in accordance with AWWPA Standards "U," "T," and "P."
 - a. Do not use material that does not comply with the requirements for untreated material.
 - b. After treatment, kiln-dry wood to a maximum moisture content of 19 percent.
 - c. After treatment, dry plywood to a maximum moisture content of 15 percent.

- d. Factory mark each treated item with the treatment quality mark of an Independent Inspection Agency approved by the ALSA Treated Wood Program.
2. Non-pressure treat Wood and Plywood, with CARB Complying, EPA Registered preservatives in accordance with AWWA Standards "U", "T", "P", and "N."

B. Fire Retardant Treatment:

1. Fire Retardant Treat Wood and Plywood with pressure treatment materials that comply with performance requirements of CBC 2303.2.
 - a. Use Exterior Type.
 - b. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures when tested by a qualified independent testing agency and is acceptable to Fire and Life Safety authorities.
 - c. Use treatment that does not promote corrosion of metal fasteners.
 - d. After treatment, kiln-dry wood to a maximum moisture content of 19 percent.
 - e. After treatment, dry plywood to a maximum moisture content of 15 percent.
 - f. Factory mark each treated item with the treatment quality mark of an Independent Inspection Agency.

2.4 ACCESSORIES

- A. Fasteners: All types shall comply with standards and dimensions of the latest edition of NDS. All types of fasteners exposed to wet or exterior conditions, in-ground contact, in pressure or preservative treated woods, in concrete or masonry, or in an area of high relative humidity shall be hot-dipped galvanized in accordance with ASTM A 153 "Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware."
1. Nails: Common wire nails or spikes complying with ASTM F 1667 "Specification for Driven Fasteners: Nails, Spikes, and Staples," and CBC Section 2304.10. Box nails and sinker nails are not permitted. Vinyl coating is permitted on common nails.
 2. Bolts: Steel bolts complying with ASTM A 307 "Specification for Carbon Steel Bolts and Standards, 60,000 PSI Tensile Strength," Grade A, hex head.
 - a. Provide hex head nuts complying with ASTM A 307 "Specification for Carbon Steel Bolts and Standards, 60,000 PSI Tensile Strength," and standard flat washers complying with ANSI/ASME B18.22.1, Type A, Wide pattern.
 3. Lag Bolts: Shall comply with ANSI/ASME B18.2.1, hex head.
 - a. Provide standard flat washers complying with ANSI/ASME B18.22.1, Type A, Wide pattern.
 4. Wood Screws: Shall comply with ANSI/ASME B18.6.1.
 - a. Screws for fastening wood to Metal Framing shall comply with ASTM C 954 "Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness."
 5. Power Driven Fasteners: Tempered Steel pins with corrosive resistant plating or coating complying with ICC ESR-1539.
- B. Metal Framing Anchors: All anchors shall comply with ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process," G60 Coating Designation for hot-dipped zinc-coated steel sheet. Provide structural, commercial, or lock-forming quality as standard with manufacturer for type of anchor indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual, which affect the execution of work under this specification section.
 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 3. Execution of work under this specification section shall constitute acceptance of existing conditions.
 4. Verify that work under this Section may be performed in strict accordance with the original design and all pertinent codes and regulations.

3.2 PREPARATION

- A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
- B. Protection:
1. Protect all materials from damage occurring from work called for under this specification section.
- C. Preservative Treatment:
1. Members requiring pressure treatment:
 - a. Sills, Plates, Ledgers, Studs, Joists, Blocking, Nailers and Furring attached or resting on or against concrete or masonry construction.
 - b. Pressure treated members cut in the field shall have the cut ends painted with preservative until the wood or plywood absorbs no more preservative.
 2. Members requiring field treatment:
 - a. All wood and plywood members at exterior walls within two feet of the ground surface.
 - b. Treat all surfaces of the member.
 - c. Treat by dipping the required portion of the member into preservative for 15 minutes or paint until the wood or plywood absorbs no more preservative. Wait a minimum of two hours after dipping or painting is complete to incorporate member into project.
 - d. Test treat items for compatibility where additional finish coats (stain or paint) may occur.
- D. Fire Retardant Treatment:
1. All wood and plywood members as indicated.
 2. All plywood panels for Telecommunication Equipment.

3.3 INSTALLATION

A. General:

1. In accordance with manufacturer's instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Selection of wood and plywood pieces:
 - a. Carefully select all members.
 - b. Select individual pieces so that knots and obvious defects will not interfere with placing bolts, proper nailing, and making proper connections.
 - c. Cut out and discard all defects which will render a piece unable to serve its intended function.
 - d. Wood and plywood may be rejected by the Architect or its Designated Design Consultant, and DSA whether or not it has been installed for excessive warp, twist, bow, crook, mildew, fungus, or mold as well as for improper cutting, fitting and treatment when required.
5. All wood and plywood shall be accurately cut to lengths required.
6. All work shall produce joints true, tight, level, plumb, and all members are securely anchored.
 - a. Do not shim any framing member.

B. Layout:

1. Lines shall be straight and true.

C. Fastening:

1. Nails:
 - a. All nailing shall be as required by CBC Table 2304.10.1 "Fastening Schedule."
 - b. Machine nailing may be approved subject to the approval of the Architect or its Designated Design Consultant, and DSA.
 - 1) The use of machine nailing is subject to a satisfactory job site demonstration for each project. The approval is subject to continued satisfactory performance.
 - 2) In plywood, if the nail heads penetrate beyond flush with the surface of the sheathing, or if minimum allowable edge distances are not maintained, the performance will be deemed unsatisfactory.
 - 3) Machine nailing will not be accepted in 5/16" plywood.
 - c. Penetration of nails or spikes shall be one-half the length of the nail or spike into the piece receiving the point.
 - d. 16d nails shall be used to connect pieces 2" in thickness unless otherwise indicated.
 - e. Clinch nails protruding through members.
 - f. Bore holes for nails where necessary to prevent splitting.
 - g. Use Finish or Casing Nails for finish work.
2. Lag Bolts:
 - a. Lag Bolts shall be screwed into place. No driving is allowed.
 - b. For the Shank portion, holes shall be bored the same depth and diameter as the shank. For threaded portion, holes shall be between 60% and 75% of the shank diameter.
 - c. Malleable Iron or Steel plate washers shall be used where bolt heads bear on wood or plywood. Washers shall have an area equal to 16 times the area of the bolt.

- 1) Steel plate washers shall have a thickness not less than 1/10 the length of the washer's longest side.
 - 2) Malleable Iron washers shall have a bearing surface for the head equal in diameter to not less than the long diameter of the head.
 - d. Tighten all bolts and screws prior to concealing within structure.
 3. Bolts:
 - a. Holes shall be 1/16" larger than bolt diameter.
 - b. Malleable Iron or Steel plate washers shall be used where bolt head and nuts bear on wood or plywood. Washers shall have an area equal to 16 times the area of the bolt.
 - 1) Steel plate washers shall have a thickness not less than 1/10 the length of the washer's longest side.
 - 2) Malleable Iron washers shall have a bearing surface for the head or nut equal in diameter to not less than the long diameter of the head or nut.
 - c. Tighten all bolts prior to concealing within structure.
 4. Power Driven Anchors
 - a. Fastening shall be accomplished by low-velocity piston-driven power activated tool.
 - b. Pins shall have guide washers to accurately control penetration.
 5. Expansion Anchors (Post-Installed Concrete Anchors):
 - a. Refer to Specification Section - DRILLED ANCHORS.
 6. Metal Framing Anchors
 - a. Use half-length nails where required or indicated.
- D. Plates:
1. Shall be in long lengths and spliced as indicated.
- E. Joists and Beams:
1. Shall be in long lengths and spliced over bearings unless otherwise indicated. Do not overcut.
 2. Install with crown side up.
 3. Beams or headers indicated to be built-up of two or more joists shall be constructed on the project site using full length members.
- F. Blocking:
1. Blocking shall be same thickness and width of studs or joists unless otherwise indicated.
 2. Install blocking at all floor, or roof penetrations.
 - a. Blocking shall provide surface for fastening applied interior or exterior flashings or flanges.
 3. Install blocking at all plywood joints.
 4. Shall be provided for ceiling finishes, fixtures and other items as indicated.
 - a. Coordinate placement of blocking and supports with manufacturer or supplier of items.
 5. Bridging shall be installed in all joist members deeper than 8 inches unless otherwise indicated.
 - a. Bridging shall extend the full depth of the joists.
 - b. Drill bridging within attics to provide ventilation as indicated.
- G. Plywood Sheathing Panels:
1. For panels with different veneer face grades, the exposed face shall always be the higher grade.

2. Space panels 1/8 inch at all edge and end joints, and in accordance with APA.
3. Panels shall be applied with the long dimension (or strength axis) across the framing.
4. Fasten from the field of the panel first and then to the ends and edges to reduce stressing of the panel surfaces.
5. Center all joints over bearing supports.
6. Wall panels shall continue uninterrupted by ceilings or soffits from floor to floor or roof unless otherwise indicated.

H. Sheathing:

1. Shall be in accordance with the following:
 - a. Roof Sheathing: CBC Section 2304.8.
 - b. Structural Roof Sheathing: CBC Section 2304.8.2.

I. Nailers and Grounds:

1. Shall be installed as indicated and where required for attaching other work.
2. Form to shapes indicated.
3. Coordinate locations with other work involved.
4. Provide nailers at all flashing and edge terminations when required by roofing manufacturer for metal and concrete roof decks. When the roof system is required to be Class A use fire-retardant treated wood.
5. Provide permanent Grounds of dressed, pressure-preservative-treated, Key-beveled wood and of thickness required to bring face of ground to exact finish thickness of finish material. Remove temporary grounds when no longer required.

J. Furring and Stripping

1. Shall be installed as indicated and where required to provide fastening material or space for the passage of pipes, conduits, etc. not accommodated including ceiling stripping.

K. Sealant:

1. When indicated, Primer shall be in accordance with sealant manufacturer recommendations.
2. When indicated, Joint Sealer shall be in accordance with Specification Section - SEALANTS.

3.4 CONSTRUCTION

A. Draftstopping:

1. Shall be provided in floor, attic, and ceiling areas in accordance with CBC Section 718.3 and 718.4.

B. Pipes:

1. Frame to avoid cutting or drilling for passage of pipes, ducts, and conduit.
2. Follow criteria as indicated for cutting or drilling. Unusual edge distances and awkward spacing and sizes shall be brought to the Architects attention for remedy.

C. Chimneys and Flues:

1. Keep all framing 2 inches away from chimney or flues in accordance with CBC Section 2304.5.

D. Temporary Enclosures:

1. Provide and maintain all barricades and enclosures required to protect the work in progress.

E. Shoring or Bracing:

1. Shore or brace for temporary support of all work as required during the construction period except any shoring and bracing specified and included under other sections of this Project Manual.

F. Wood Curbs for Equipment:

1. Construct all wood curbs for roof mounted equipment.
2. Provide all miscellaneous blocking, bracing, supports, and other wood items to complete the work.

3.5 FIELD QUALITY CONTROL

A. Site Tests:

1. As required by Regulatory Requirements.
2. Project Inspector shall verify by means of a handheld moisture content meter that all wood and plywood supplied at the time of incorporation into structure(s) has met applicable moisture content requirements.
3. Project Inspector shall test all stud cavity walls to ensure that studs are a maximum of 19 percent moisture content prior to any other construction that encloses the wall cavity.

B. Inspection:

1. As required by Regulatory Requirements.
2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.

3.6 CLEANING

A. Removal of Debris:

1. Remove all Wood, including form lumber, chips, shavings and sawdust in or on the ground from the areas inside buildings. Do not bury debris in fill.

END OF SECTION

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SECTION 061713 – COMPOSITE LUMBER

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all Structural Composite Lumber (SCL) materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - a. "Composite Lumber" is also known as "Structural Glued Lumber," and requires a Grade Stamp indicating that it is "Certified Glued Lumber" – (CGL).
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 05 12 00 STEEL AND FABRICATIONS
 - 4. 06 10 00 ROUGH CARPENTRY
 - 5. 06 17 33 WOOD JOISTS
 - 6. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 7. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. Standards:
 - 1. In accordance with the following standards:
 - a. ICC International Code Council
 - b. NDS National Design Specification for Wood Construction
 - c. NIST National Institute of Standards and Technology
 - d. PS Product Standard; of the US Department of Commerce

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 - 1. Product Data:
 - a. Indicate SCL material and dimensions and include construction and application details.
 - 2. Shop Drawings:
 - a. Submit shop drawings detailing fabrication and installation of the work under this section, as well as procedures, diagrams, and attachment to other units of work.
 - 3. Quality Assurance Submittals:
 - a. Reports:
 - 1) Submit product ICC Evaluation Reports.
 - 2) Submit DSA Product Acceptance Report.
 - b. Certificates:

- 1) Provide document indicating Manufacturing facility has met the approval of an independent ICC Approved Inspection Agency.
 - 2) Provide Accredited Grade Stamps indicating "Certified Glued Lumber" - CGL.
 - 3) Provide document indicating 3 projects of similar size that the proposed installer has successfully completed.
4. Closeout Submittals:
- a. Warranty in accordance with Specification Section –WARRANTIES.
 - b. Project "AS-BUILT" Documents and Project "RECORD" Documents.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Material Qualifications:
 - a. All materials shall be in accordance with ASTM Requirements, ICC Evaluation Reports, DSA Product Acceptance Reports and manufacturers engineering requirements.
 - 1) Composite Lumber shall be designated "Certified Glued Lumber" (CGL) and grade stamped by an inspection agency accredited by the American Lumber Standard Committee (ALSC) to supervise glued lumber manufacturing, in accordance with IR 23-10.
 - a) CGL shall be graded in conformance to ALSC Glued Lumber Policy (GLP) and Voluntary Product Standard PS 20-99 or current standard.
2. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
3. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing and supplying products indicated for this Project, with sufficient capacity to supply required units without causing delay in the work.
 - b. Manufacturing facility shall be approved by an independent ICC approved inspection agency.
 - c. Obtain each type of product through one source from a single manufacturer.

B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Meetings:

1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.

- c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 1. Products shall be handled in such a manner as to assure that they are free from gouges, scratches and other damage.
- B. Acceptance at Site:
 1. Products must be in the approved manufacturer's packaging with labels indicating brand name, size, and grade.
 2. Damaged products will not be accepted.
- C. Storage and protection:
 1. Products shall be stored vertically above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.6 PROJECT CONDITIONS

- A. Existing Conditions:
 1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
 2. Field Measurements: Take and be responsible for field measurements as required. Report any significant differences between field dimensions and the contract document conditions to Architect.
 3. Carefully coordinate work under this Section with that of the structural framing sections and details so that the interface between structural framing and non structural framing shall provide the lines and degree of finish shown and specified.

1.7 WARRANTY

- A. Contractor's General Warranty:
 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:

1. In accordance with the terms of the Specification Section - WARRANTIES
 - a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 1. Specified product manufacturer:
 - a. REDBUILT using "RedLam" Products as shown on the drawings:
 - 1) Laminated Veneer Lumber (LVL).
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.
 1. Other manufacturer's products complying with these specifications and having equivalent properties and dimensions shall be subject to Architect's and DSA's review upon submission of substantiating data. Structural capacities shall be evaluated by ASTM D 2559 "Specification for Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions," ASTM D 5456 "Specification for Evaluation of Structural Composite Lumber Products," and independent structural testing. DSA Product Approval is required for all substitutions.

2.2 MATERIALS

- A. Wood:
 1. Species: Use Douglas Fir, Lodge-Pole Pine, or Western Hemlock.
- B. Adhesive:
 1. Adhesives shall be exterior type and in compliance with ASTM D 2559 "Specification for Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions."

2.3 MANUFACTURED UNITS

- A. Laminated Veneer Lumber (LVL):
 1. Prefabricated in accordance with ICC Evaluation Service Report ESR-2993, and ASTM D 5456 "Specification for Evaluation of Structural Composite Lumber Products."

2.4 ACCESSORIES

- A. Fasteners: Refer to Specification Section – ROUGH CARPENTRY.

- B. Metal Framing Anchors: Refer to Specification Section – ROUGH CARPENTRY.
- C. Metal Timber Framing Connectors: Refer to Specification Section – ROUGH CARPENTRY.

2.5 SOURCE QUALITY CONTROL

- A. Fabrication Tolerances:
 - 1. Fabrication shall be in compliance with specified standard and industry specifications and requirements of the ICC Evaluation Service Report.
 - a. Fabrication shall be in accordance with best practices with adequate plant and equipment and under supervision of properly qualified personnel and at plant stated in listing report.
 - b. Moisture content of components at time of gluing shall not be less than 7 percent nor more than 16 percent.
- B. Tests, Inspection:
 - 1. Manufacturing facility shall be approved by an independent ICC approved inspection agency.
- C. Identification:
 - 1. All joists shall bear a stamp indicating the manufacturer's name and / or logo, the logo of the Inspection Agency, the ICC Evaluation Service Report Number, the plant number, the product type, production date, the grade, and species.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
 - 1. Prior to the execution of the work, inspect the installed work executed under other specification sections, which affect the execution of work under this specification section.
 - 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 - 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Coordination:
 - 1. Coordinate work under this specification section with work specified under other specification sections to ensure proper and adequate interface of work.
- B. Protection:
 - 1. Protect all adjacent surfaces from damage from work under this specification section.

3.3 ERECTION

A. General:

1. Members are to be erected and installed in accordance with the drawings and manufacturers recommendations. Comply with all manufacturers recommendations concerning temporary construction loads and erection bracing.
 - a. Temporary construction loads that cause stresses beyond design limits are not permitted. Safety bracing is to be provided by the installer to keep SCL members straight and plumb as required and to ensure adequate lateral support for the individual SCL members and the entire system until the sheathing material has been applied.
 - b. The Contractor shall give notification to the SCL manufacturer's representative, prior to enclosing the framing, to provide an opportunity for review of the installation.
2. LVL members shall not be bored, drilled, cut, or notched without approval of the Architect and the Structural Engineer.
3. In accordance with approved shop drawings.
4. In accordance with Regulatory Requirements.
5. Set plumb, level, and square.
6. Damaged products shall not be installed.

B. Layout:

1. Lines shall be straight and true.

3.4 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.

1. Keep premises free from accumulated waste materials, rubbish and debris resulting from this work. Upon completion, remove tools, appliances, surplus materials, waste materials, rubbish, debris and accessory items used in or resulting from said work, and legally dispose of off the site.

END OF SECTION

SECTION 061733 – WOOD JOISTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install all Wood Joist materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents, and as follows:
 - a. All Wood Joists, joist blocking, bridging, etc., for the installation of joists.
 - b. Clips, angles, straps, hangers, etc., incidental to installation of joists.
 - c. Nails, bolts, washers and other fasteners used for erecting and securing Wood Joists.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 05 12 00 STEEL AND FABRICATIONS
 4. 06 10 00 ROUGH CARPENTRY
 5. 06 17 13 COMPOSITE LUMBER
 6. 07 21 00 INSULATION
 7. 09 50 00 ACOUSTICAL CEILINGS
 8. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 9. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. Standards:
1. In accordance with the following standards:
 - a. ICC International Code Council
 - b. NDS National Design Specification for Wood Construction
 - c. NIST National Institute of Standards and Technology
 - d. PS Product Standard; of the US Department of Commerce

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data.
 - a. Indicate wood joist material and dimensions and include construction and application details.
 2. Shop Drawings.

- a. Submit shop drawings prepared by, or under the supervision of, a registered Civil or Structural Engineer in the State of California. Detail fabrication and installation of the work under this section, as well as procedures, diagrams, and attachment to other units of work. Each Drawing Sheet shall be stamped and signed by said engineer.
- 3. Quality Assurance/Control Submittals:
 - a. Reports:
 - 1) Submit product ICC Evaluation Reports.
 - 2) Submit DSA Product Acceptance Report.
 - b. Certificates:
 - 1) Provide document indicating Manufacturing facility has met the approval of an independent ICC Approved Inspection Agency.
 - 2) Provide document indicating 3 projects of similar size that the proposed installer has successfully completed.
 - c. Manufacturer's Field Installation Review Reports:
 - d. Engineering Calculations:
 - 1) Submit Engineering Calculations computed, stamped, and signed by a registered Civil or Structural Engineer in the State of California.
- 4. Closeout Submittals:
 - a. Warranty in accordance with specification section –WARRANTIES.
 - b. Project "AS-BUILT" Documents and Project "RECORD" Documents.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Material Qualifications:
 - a. All materials shall be in accordance with ASTM Requirements, ICC Evaluation Reports, DSA Product Acceptance Report and DSA IR A-5, and manufacturers engineering requirements.
 - 2. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - 3. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing and supplying products indicated for this Project, with sufficient capacity to supply required units without causing delay in the work.
 - b. Manufacturing facility shall be approved by an independent ICC approved inspection agency.
 - c. Capable of providing competent on-site review of product installation and written verification of compliance with installation requirements.
 - d. Obtain each type of product through one source from a single manufacturer.
- B. Regulatory Requirements:
 - 1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. DSA IR Division of the State Architect, Interpretation of Regulations.

- 1) Including DSA IR 23-9 "Prefabricated Wood I-Joist: 2019 CBC."

C. Meetings:

1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

1. Products shall be handled in such a manner as to assure that they are free from gouges, scratches and other damage.

B. Acceptance at Site:

1. Products must be in the approved manufacturer's original packaging with labels indicating brand name, size, and grade.
2. Damaged products will not be accepted.

C. Storage and Protection:

1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.6 PROJECT CONDITIONS

A. Existing Conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Field Measurements: Take and be responsible for field measurements as required. Report any significant differences between field dimensions and the contract document conditions to Architect.
3. Carefully coordinate work under this Section with that of the structural framing sections and details so that the interface between structural framing and non structural framing shall provide the lines and degree of finish shown and specified.

1.7 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section - WARRANTIES
 - a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified product manufacturer:
 - a. REDBUILT "Red-165" per drawings.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.
 - 1. Other manufacturer's products complying with these specifications and having equivalent properties and dimensions shall be subject to Architect's and DSA's review upon submission of substantiating data. Structural capacities shall be evaluated by ASTM D 5055 "Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists," and independent structural testing. DSA Product Approval is required for all substitutions as listed in DSA Acceptance Criteria 23-1.

2.2 MATERIALS

- A. Flanges:
 - 1. Structural Composite Lumber Flanges shall be in compliance with the requirements of ASTM D 5456 "Specification for Evaluation of Structural Composite Lumber Products."
- B. Webs:
 - 1. Structural panel webs shall be of Oriented Strand Board in compliance with PS2, Exposure 1, or Plywood in compliance with PS1, Exterior Grade.
 - a. Oriented Strand Board material of I-Joists shall be stamped with the Brand Name, grade, thickness, mill location, and mill number.

C. Adhesives:

1. Adhesives shall be exterior type and in compliance with ASTM D 2559 "Specification for Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions."

2.3 MANUFACTURED UNITS

A. I-Joists:

1. Prefabricated in accordance with DSA PA-048, ICC Evaluation Service Report ESR-2994, and ASTM D 5055 "Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists."
2. Miscellaneous blocking, bridging, rim joists and web stiffeners, shall be furnished per above listed regulations, references, and standards.

2.4 ACCESSORIES

- A. Fasteners: Refer to Specification Section – ROUGH CARPENTRY.
- B. Metal Framing Anchors: Refer to Specification Section – ROUGH CARPENTRY.

2.5 SOURCE QUALITY CONTROL

A. Fabrication Tolerances:

1. Fabrication shall be in compliance with specified standard and industry specifications and requirements of DSA AC 23-1 and ICC Evaluation Service Report #ESR-2994.
 - a. Fabrication shall be in accordance with best practices with adequate plant and equipment and under supervision of properly qualified personnel and at a plant stated in the Listing Report.
 - b. Moisture content of components at time of gluing shall not be less than 7 percent nor more than 16 percent.
 - c. Depth: Plus or Minus 1/16".
 - d. Flange Width: Plus or Minus 1/16".

B. Identification:

1. All joists shall bear a stamp indicating the joist series, ICC-ES Evaluation Report Number, manufacturer's name, plant number, date of fabrication, and independent inspection agency's logo.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions:

1. Prior to the execution of the work, inspect the installed work executed under other specification sections which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.

3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Coordination:
 1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
- B. Protection:
 1. Protect all adjacent surfaces from damage from work under this specification section.

3.3 ERECTION

- A. General:
 1. Joists are to be erected and installed in accordance with the drawings and manufacturers recommendations. Comply with all manufacturer's written recommendations concerning temporary construction loads and erection bracing.
 - a. Temporary construction loads that cause stresses beyond design limits are not permitted. Safety bracing shall be provide by the installer to keep the joists straight and plumb as required and to ensure adequate lateral support for the individual joists and the entire system until sheathing material has been applied.
 - b. The Contractor shall give notification to the joist manufacturer's representative, prior to enclosing the joists, to provide an opportunity for review of the installation.
 2. In accordance with approved shop drawings.
 3. In accordance with Regulatory Requirements.
 4. Set plumb, level, and square.
 5. Use equipment and methods that avoid damages that may impair strength of Wood I-Joists joists. Sharp instruments and unprotected wire rope, chain slings and the like shall not be permitted.
 6. Damaged products shall not be installed.
- B. Layout:
 1. Lines shall be straight and true.

3.4 FIELD QUALITY CONTROL

- A. Inspection:
 1. As required by Regulatory Requirements.
 2. Manufacturer's representative shall provide on-site Field Installation Review Report indicating compliance with manufacturer's requirements.

3.5 CLEANING

- A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.

1. Keep premises free from accumulated waste materials, rubbish and debris resulting from this Work. Upon completion, remove tools, appliances, surplus materials, waste materials, rubbish, debris and accessory items used in or resulting from said Work, and legally dispose of off the site.

END OF SECTION

SECTION 064123 – MODULAR CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all Modular Casework materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - a. Phenolic composite casework.
 - b. Adjustable shelf supports: Metal Shelf Standards
 - c. Solid-Surface countertops.
 - d. Sheet Metal Countertop.
 - e. Plastic fabrications.
 - 2. Version: Clovis Unified School District Standards 2018.

- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 15 14 DRILLED ANCHORS
 - 4. 03 30 00 CAST-IN-PLACE CONCRETE
 - 5. 04 22 00 CONCRETE MASONRY UNITS
 - 6. 05 12 00 STEEL AND FABRICATIONS (Steel supports for modular casework)
 - 7. 06 10 00 ROUGH CARPENTRY
 - 8. 07 60 00 SHEET METAL
 - 9. 08 70 00 HARDWARE
 - 10. 09 22 16 METAL FRAMING
 - 11. 09 29 00 GYPSUM BOARD
 - 12. 09 65 10 RESILIENT BASE AND ACCESSORIES
 - 13. 09 72 00 WALL COVERINGS
 - 14. 09 91 00 PAINTING
 - 15. 10 05 00 MISCELLANEOUS SPECIALTIES
 - 16. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

- A. Standards:
 - 1. In accordance with the following standards:
 - a. BHMA BHMA stands for Builders Hardware Manufacturers Associates, Inc.
 - b. NAAWS "North American Architectural Woodwork Standards," Latest Edition, including latest amendments, by the Architectural Woodwork Institute, Architectural Woodwork Manufacturers Association of Canada, and the Woodwork Institute.

- c. NEMA National Electrical Manufacturers' Associates, Publication Number LD3, latest-edition
- d. NIST National Institute of Standards and Technology
- e. NWMA "Industrial Standard" National Woodwork Manufacturer's Association.
- f. PS Product Standard of the U. S. Department of Commerce
- g. WI Woodwork Institute

1.3 DEFINITIONS

- A. Refer to NAAWS.
- B. Exposed Portions:
 - 1. Face members and edges of cabinets (cabinet fronts), such as face plates, drawer fronts, door fronts, front edge of shelves.
 - 2. Interior faces of cabinet doors.
 - 3. Underside of bottoms of upper cabinets, 48" above finished floor.
 - 4. Cabinet tops:
 - a. Under 72" above finish floor.
 - b. Visible from upper building level.
 - 5. Interior surfaces (including top, bottom, and front of shelves) of open cabinets.
 - 6. All surfaces of exposed shelves.
 - 7. All surfaces exposed to view.
- C. Semi-Exposed Portions:
 - 1. Cabinet divisions, shelves, insides of drawers, and any other cabinet members which cannot be seen when door or drawers are closed.
- D. Concealed Portions:
 - 1. Cabinet framing that cannot be seen, such as web frame members, sleepers, dust panels, toe strips covered with resilient base.
- E. Shelving:
 - 1. Top and bottom surfaces. Face surfaces are the front and rear edges.
 - a. Ends are the left/right edges as you face the cabinet.
 - 2. The bottom surface material of all Upper Cabinets attached to walls shall be considered a shelf and manufactured as a shelf.
- F. Quality Assurance Options:
 - 1. Certified Compliance Program (CCP):
 - a. The CCP is an established discipline of quality control, for use in conjunction with the NAAWS, which provides a non-biased means of confirming conformance to a project's drawings and specifications.
 - b. Contractor to provide field inspection by WI Director, additional to CCP requirements.
 - c. The Woodwork Manufacturer shall have no less than 5 years of production experience, similar to this project, whose qualifications indicate the ability to comply with the requirements of this Section.
 - d. The Woodwork Manufacturer must have at least one project in the past 5 years where the value of the woodwork was within 20 percent of the cost of woodwork for this Project.
 - 2. Monitored Compliance Program (MCP):

- a. The MCP is an established discipline of quality control, for use in conjunction with the NAAWS, which provides a non-biased means of confirming conformance to a project's drawings and specifications,
- b. Includes ongoing review/inspections of the project from its start to certification at completion.
- c. The Woodwork Manufacturer shall have no less than 5 years of production experience, similar to this project, whose qualifications indicate the ability to comply with the requirements of this Section.
- d. The Woodwork Manufacturer must have at least one project in the past 5 years where the value of the woodwork was within 20 percent of the cost of woodwork for this Project.

1.4 SYSTEM DESCRIPTION

- A. Performance Requirements: It is the intention of this specification section and the drawings to form a guide for a complete and operable system. Any items not specifically noted but necessary for a complete and operable system shall be provided under this section.
 1. All shelving must be manufactured according to NAAWS for Schools, Hospitals and Library or Book Shelving. 50 lbs./SF.

1.5 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 1. Product Data.
 - a. Submit manufacturer's full color range (including any standard and premium colors) for selection by the Architect.
 - b. Submit 2 copies of Manufacturer's current specifications for Modular Casework including all types of cabinets and accessories included in this section to the Architect for approval prior to fabrication.
 2. Shop Drawings.
 - a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loadings, required clearances, method of field assembly, seam locations, components, and location and size of each field connection.
 - b. Shop Drawing format in accordance with NAAWS Section 1, Submittals and WI's Certified Compliance Program.
 - 1) The shop drawings for the modular casework shall comply with and bear the **WI CERTIFIED COMPLIANCE LABEL**.
 - 2) Each elevation of casework, each laminated plastic top, and each solid surface top shall bear a **WI CERTIFIED COMPLIANCE LABEL**.
 - 3) Indicate spacing of all hardware accessories for Architect's review of layout.
 - 4) On casework and countertop elevations show the location of backing required for attachment within walls.
 - 5) Before delivery to the jobsite the woodwork supplier shall provide a **WI CERTIFIED COMPLIANCE CERTIFICATE** indicating the millwork products being supplied and Certifying that these products fully meet the requirements of the Grade or Grades specified.

- 6) At completion of installation the woodwork installer shall provide a WI CERTIFIED COMPLIANCE CERTIFICATE indicating the products installed, and Certifying that the installation of these products fully meets the requirements of the Grade or Grades specified.
 - 7) All fees charged by the Woodwork Institute for their Certified Compliance Program are the responsibility of the millwork manufacturer and/or installer and shall be included in their bid.
3. Samples.
- a. Provide nominal 2" x 3" sample chains of manufacturer's non-premium and premium phenolic color selection lines.
 - 1) Provide finish color selection samples of Pilaster Standard. Specified colors subject to change.
 - b. Mock-up as described elsewhere in this section.
 - c. Provide nominal 2" x 3" sample chains of manufacturer's non-premium and premium Solid Surface Countertop color selection lines.
4. Quality Assurance/Control Submittals:
- a. Certificates:
 - 1) Submit three (3) copies of the following:
 - a) Before delivery to the jobsite, the modular cabinetwork supplier shall issue a WI CERTIFIED COMPLIANCE CERTIFICATE indicating the modular cabinetwork products and/or fabrication of products to be furnished for this project shall meet fully all the requirements of the grade or grades specified.
 - b) Upon completion of inspection of installation by WI Inspector, a WI CERTIFIED COMPLIANCE CERTIFICATE shall be furnished for the installation.
 - 2) Submit three (3) copies of a letter on Contractor's Letterhead certifying work provided, meets or exceeds, the requirements of this Section.
 - b. Labels:
 - 1) Each plastic laminate countertop supplied shall bear the WI CERTIFIED COMPLIANCE LABEL.

1.6 QUALITY ASSURANCE

- A. Qualifications:
- 1. Material Qualifications:
 - a. Grades as indicated on the drawings in accordance with the specifications, rules and details or casework of the NAAWS Sections 5 "Finishing," 10 "Casework," and 11 "Countertops," unless the drawings and these specification modify said standards.
 - 1) See Appendix "A" for "Cabinet Design Series" (CDS) Number System used on Modular Casework Schedule.
 - b. Solid Plastic Countertops, Splashes, and Wall Paneling in accordance with NAAWS Section 11 "Countertops."
 - 2. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - 3. Manufacturer/Supplier Qualifications:

- a. Firm(s) experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
- b. All modular Cabinet Work must be done by a Single Source WI licensed manufacturer and be able to provide a WI Certified Compliance Certificate.
- c. Participation in Woodwork Institute Quality Assurance Program:
 - 1) If supplier is WI Member Licensee in good standing:
 - a) Comply with WI CERTIFIED COMPLIANCE PROGRAM (CCP).
 - b) Provide WI Director to inspect installation on-site.
 - 2) If supplier is not WI Member Licensee in good standing:
 - a) Comply with WI MONITORED COMPLIANCE PROGRAM (MCP).

B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. CBC All hardware for casework shall meet CBC Section 11B-309.4 and 11B-811.4.

C. Mockups:

1. Prior to fabricating or installing Modular Cabinet Work, construct a mockup to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Provide one lower cabinet with drawer, and one upper cabinet, with all examples of hardware for both lower and upper cabinets.
2. Provide mock-up of exposed and interior cabinet surfaces with Pilaster Shelf Standard for review and comment prior to fabrication. Color selection of Pilaster may be subject to change.

D. Meetings:

1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with all other related work
 - b. identify potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
 - c. Review the locations of backing required for casework installation as shown on the casework shop drawings and the Contract Documents.
 - d. Review the method of attachment of the backing to the wall system as shown on the Contract Documents.
2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. WI Inspector, Project Inspector, and the Architect shall inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Packing, Shipping, Handling, and Unloading:
 - 1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
- B. Acceptance at Site:
 - 1. Hardware products (not already applied) must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
 - 2. Casework products must be free from scratches, gouges, or any other marring or discoloration.
 - 3. Damaged products will not be accepted.
- C. Storage and Protection:
 - 1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units, in compliance with PROJECT CONDITIONS below.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.8 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Humidity and Temperature: Maintain humidity and temperature in the space to receive products between 45 percent to 65 percent at a temperature of 60 degrees to 90 degrees F. Equilibrium Moisture Content of the wood product conditions shall be maintained between 8 percent and 12 percent. Maintain these requirements for four (4) days minimum prior, during, and following installation in accordance with manufacturer's written recommendations. Inform the Owner of humidity requirements for products installed and maintain until Substantial Completion and the turn-over of the building or facility to the Owner.

1.9 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
 - b. Clovis Unified Warranty Period Two (2) Years.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section - WARRANTIES
 - a. Warranty Period One (1) Year.
 - b. Clovis Unified Warranty Period Two (2) Years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified product manufacturers:
 - a. Solid Phenolic: DURACON, A WILSONART COMPANY.
 - b. Solid Surfacing: E.I.DuPONT "CORIAN".
 - c. Plastic Fabrications: 3-FORM.
 - d. Cabinetry Hardware: See Cabinet Hardware Schedule.
 - e. Countertop Support Brackets US FUTABA, #72531.

- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 CABINET MATERIALS

- A. Phenolic-Composite:
 - 1. Grade: Chemical Resistant.
 - 2. Phenolic Composite: Solid, high-pressure decorative laminate, complying with NEMA LD 3, Grade CGS.
 - 3. Core Color: Refer to Appendix B - Interior Color Schedule for color.
 - 4. Finish Color: Refer to Appendix B - Interior Color Schedule for color.

- B. Exposed Materials:
 - 1. Laminate Systems:
 - 2. Solid Surface:
 - a. Decorative synthetic marble of solid (mineral and acrylic filled) Methyl Methacrylate.
 - 3. Sheet Metal Surface:
 - a. Refer to SHEET METAL Specification Section.
 - 4. Phenolic-Composite:
 - 5. Plastic Fabrications:
 - a. General:
 - 1) Rate of Burning (ASTM D 635). Material must attain CC1 Rating for a nominal thickness of 1.5 mm (0.060 in.) and greater.
 - 2) Self-Ignition Temperature (ASTM D 1929). Material must have a Self-ignition temperature greater than 650 deg F.
 - 3) Density of Smoke (ASTM D 2843). Material must have a smoke density less than 75 percent.

- 4) Flame spread and Smoke developed testing (ASTM E 84). Material must be able to meet a level of Class A (Flame spread less than 25 and smoke less than 450) at thickness of 1 inch.
- 5) Room Corner Burn Test (NFPA 286). Material must meet Class A criteria at 1/4" thickness as described by the latest International Building Code.
- 6) Extent of Burning (UL 94). Must submit UL card.
- 7) Impact strength. Minimum impact strength test as measured by ASTM D 3763 of 20 ft. lbs. (for durability, shipping, installation, and use).
- 8) Safety Glazing. Material must attain a Class A impact rating in accordance with ANSI Z97.1-2004 at 1/8" thickness.
- 9) UPITT Test for Combustion Product Toxicity: Product must be recorded as "not more toxic than wood."

b. Type 1:

- 1) Product: Insert Collection and Product Name
- 2) Color: insert Color
- 3) Gage: insert gage
- 4) Surface Finish:
 - a) Patent, Markerboard Plus, Patina, Pixel, Sandstone, Stucco, Supermatte, Other.
- 5) UV Protection: Required.
- 6) Edge Sealing: Required.
- 7) Attachment Method:

C. Semi-Exposed Materials:

1. Cabinet Liner:

D. Fasteners (All Stainless Steel for corrosive environments):

1. Per NAAWS.
2. Corrosion resistant fasteners throughout the assembly of modular casework.
3. Confirmat screws.

2.3 FABRICATION

A. General:

1. In accordance with NAAWS Section 10 - Casework, Custom Grade, as amended by the Contract Documents.
2. Interface Style, Frameless: Flush Overlay.
3. Attachment method: Confirmat screws.
4. Seismic Force Requirements - The types of construction approved by WI that meet CBC Title 24 seismic force requirements are: Lock Joint, Dowled, Dowled / Screwed Construction, Rabbeted Construction, Confirmat Screws, Fully Plowed-in Back, and Backs Screwed on in rabbeted ends, tops, and bottoms. The exact method for seismic force construction is available from WI.
5. Construct openings and backing as required for work done under Division 22 PLUMBING (sinks, plumbing, etc.) and Division 26 ELECTRICAL (outlets, switches, wiring, etc).
 - a. Exposed Edges: All exposed edges shall be sealed; including sink cut-outs & bottom edges of front edges.
6. Cabinets ganged together or attached to the wall shall be attached with countersunk screws to prevent binding of shelves when provided later.

7. Any vertical or horizontal plane surface less than four (4) foot wide and twelve (12) foot long shall be faced with one continuous sheet with the intent to minimize the number of seams throughout the work, in compliance with NAAWS Section 8 "Wall Surfacing."
8. Exposed ends, panels, and back panels shall flush out with face of doors and drawer fronts.

B. Cabinets:

1. Cabinet box (Verify thickness of span with material being specified):
 - a. Bottoms and Ends of Cabinets: 3/4-inch Phenolic composite.
 - b. Tops of Wall Cabinets and Tall Cabinets: 3/4-inch Phenolic composite.
 - c. Backs of Cabinets: Phenolic composite.
 - 1) Concealed Backs: 1/4" minimum.
 - 2) Exposed Backs: 1/2" minimum.
2. Filler Strips:
 - a. Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets.
3. Shelving System (Finish shall be corrosion resistant for corrosive environment):
 - a. Shelf Support System:
 - 1) Metal Shelf Standards:
 - a) Surface mounted on vertical faces of cabinet.
 - b) Shelves shall be full widths of openings, flush with inside face of cabinet doors, and dadoed around shelf standards to prevent movement during seismic events.
 - 2) Provide four clips for each shelf.
 - b. Shelves: Phenolic composite (Verify thickness of span with material being specified):
 - 1) Span less than 25-inches: 3/4-inch thick min.
 - 2) Span greater than 25-inches: 1-inch thick min.
 - 3) Library shelves of any span: 1-inch thick min.
4. Doors (Verify thickness of span with material being specified) :
 - a. Doors: 11/16 inch core, 3/4 inch thick finished.
 - 1) Core material: Phenolic composite.
 - b. Large doors (Verify thickness of span with material being specified): 1 inch core, 1-1/16 inches thick finished.
 - 1) Large doors are more than 48 inches high and more than 24 inches wide.
 - 2) Core material: Phenolic composite.
 - c. Hinges:
 - 1) Let in 1/8 inch reveals for institutional hinges.
 - 2) Up to 48" high Doors: 3 hinges unless otherwise indicated on the drawings.
 - 3) 48" to 80" high Doors: 4 hinges unless otherwise indicated on the drawings.
 - 4) Door higher than 80": 5 hinges unless otherwise indicated on the drawings.
5. All doors shall be locked, keyed alike in each room and with building masters and grand master.
 - a. Each room shall be keyed alike:
 - 1) Provide 4 keys per lock.
 - 2) Provide 6 master keys.

C. Countertops:

1. General: In accordance with NAAWS Section 11 -- Countertops, as amended by the Contract Documents.
 2. Solid Surface Countertops:
 - a. Solid Surface thickness: 1/2 inch at counter and back splash.
 - b. Core: Veneer-Core Plywood - see drawings for thickness required.
 - c. Front Edge: Refer to drawings
 3. Sheet Metal:
 - a. Sheet Metal thickness: Refer to drawings and SHEET METAL Specification Section
 - b. Core: Veneer-Core Plywood - see drawings for thickness required.
 - c. Front Edge: Refer to drawings.
- D. Hardware:
1. See schedule at the end of this section for typical cabinet hardware.
 2. Hardware shall be furnished and installed as required to provide a complete casework installation for overlay construction, unless noted otherwise.
 3. Provide metal strike at locks.
 4. Finish: BHMA 630 (US32), unless otherwise noted.
- E. Countertop Supports
1. Steel Support Angle and Base Plate:
 - a. Single-piece construction: All welded ground smooth, flush and level.
 - b. Finish: Galvanized.
 - c. Angle material to be A36 (Fy=36ksi).
 - d. Plate material to be A36 (Fy=36ksi).
 - e. All welding to conform to NAAWS and shall be done by certified welders.
 - f. All work shall conform to the latest edition of the American Institute of Steel Construction.
 2. Counter Support Brackets:
 - a. Single-Piece Construction: 1/8" Steel.
 - b. Finish: Powder Coat.
 - c. Size: As required by Countertop length.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual, which affect the execution of work under this specification section.
 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:

1. Coordinate work under this specification section with work specified under other specification sections to ensure proper and adequate interface of work specified under this specification section.

B. Protection:

1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:

1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
 - a. Provide experienced, factory trained craftspeople under manufacturers direct supervision.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. The entire installation shall present a first class, workmanlike appearance, without open joints, tool marks or other blemishes, and subject to the Architect's approval.
5. Edges of cutouts, subject to excessive moisture, shall be sealed with a color-toned (for verification), water-resistant sealer before trim or sink rims are installed.

B. Layout:

1. Set plumb, level, and to true lines as shown on the drawings.
2. Filler panels and scribe strips or moldings, as required, shall be properly scribed to adjacent work and securely attached to cabinets as indicated on the drawings.

C. Anchorage:

1. The backs of the cabinets shall be secured to the wall backing.
2. Refer to the Drawings for the backing and anchorage details.
3. As a minimum, each cabinet shall be secured to the backing with a total of four #14 screws.

D. Cabinet Bases:

1. Toe Kick: Cabinet base shall be set back from the face of the cabinet 3-inches, or as indicated
2. Cabinet sides: Cabinet shall be set 3/8-inch back from the face of the cabinet.

3.4 FIELD QUALITY CONTROL

- A. Inspection:
1. Schedule WI inspection with a minimum of 7 days notice of planned installation.
 2. Schedule inspections and notify the Architect, Owner's Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
 3. No work shall be without the inspections required by Regulatory Requirements.

3.5 ADJUSTING

- A. Test and adjust carpentry hardware. Replace damaged or malfunctioning controls and equipment.

3.6 CLEANING

- A. Clean in accordance with Specification - PROJECT CLOSEOUT.
1. Clean any soiled surfaces immediately.
 2. In accordance with manufacturer's written instructions and recommendations.
 3. Finish shall be clean and ready for the application of any additional finishes.

3.7 PROTECTION

- A. Protection from traffic:
1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.8 SCHEDULES

- A. Standard Cabinetry Hardware specified, or approved equivalent (All hardware shall be stainless Steel due to corrosive environment):
1. Hinges: Institutional Hinges for Overlay doors, 2-3/4" five knuckle with hospital tips and 2-5/8" extended side panel wing:
 - a. ROCKFORD PROCESS:
 - 1) #374 for 3/4" side panel x 3/4" thicknesses.
 - 2) #376 for 3/4" side panel x 13/16" thicknesses.
 2. Pulls (Steel Wire "U" Shaped - 4" centers, 1-1/4" Projection from face of drawer or door):
 - a. JAMISON: SWP4-US32.
 3. Locks (Hinged Doors for Overlay Construction):
 - a. COMP X NATIONAL: #C8053 (Provide compatible strike)..
 - b. Approved equivalent manufacturer:
 - 1) OLYMPUS LOCK, INC. #DCN as required (Provide compatible strike).
 4. Adjustable Shelf Pilaster Standard and Shelf Supports:
 - a. Pilaster Standard shall be KNAPE & VOGT #255, 19-gage x 5/8" wide x 3/16" high.

- 1) #255-WH (Epoxy-Coated White) at interior cabinet surface locations.
- 2) #255-BRN (Brown) at exposed cabinet surface locations.
- b. Shelf Supports shall be KNAPE & VOGT #239 ZC (Zinc Coated).
- 5. Magnetic Catcher:
 - a. AMEROCK: #CM9783-AL.
 - b. Approved equivalent manufacturer:
 - 1) KNAPE AND VOGT: #918-AL.
- 6. Exposed Fasteners: When exposed fasteners are used, provide Stainless Steel oval head, self-tapping phillips screws with grommet finishing washers, same finish as screws.
- 7. Hat and Coat Hooks (Stainless Steel wardrobe hook):
 - a. BOBRICK #b-6827.
 - b. Fasteners: #14 x 2 1/2" type-304 stainless steel, round-head, screws
- 8. Cabinet Catch (only when indicated on the drawings)
 - a. STANLEY #CD34.
- 9. Label Plate:
 - a. HAFELE #168.02.761.
- 10. Grommets, Cable Managers and Cabinet Vents:
 - a. Provide grommets, cable managers and cabinet vents in various sizes, finishes and shapes, as indicated on the drawings and as otherwise required for a complete installation.
 - b. Provide type S/S-3 Grommet for all conditions not noted. Grommets & Air Vents by DOUG MOCKETT & COMPANY, INC., or approved equivalent.
- 11. Miscellaneous Hardware Items:
 - a. HAFELE: (Stainless Steel)
 - 1) Miscellaneous: screws, washers, nuts, threaded pins, screw-in sleeves, shelf supports with locking screws, connecting fittings, & capped bolts.

END OF SECTION

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SECTION 071416 – FLUID-APPLIED WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all fluid applied waterproofing system materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

- B. Related Sections: The following Project Manual Sections contain requirements that relate to this Section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 30 00 CAST-IN-PLACE CONCRETE
 - 4. 04 21 00 BRICK MASONRY UNITS
 - 5. 04 22 00 CONCRETE MASONRY UNITS
 - 6. 05 30 00 METAL DECK
 - 7. 07 60 00 SHEET METAL
 - 8. 07 92 00 SEALANTS
 - 9. 31 20 00 EARTHWORK
 - 10. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 11. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 - 1. Product Data: Materials list, manufacturer's catalog sheets and other product information.
 - 2. Quality Assurance/Control Submittals:
 - a. Manufacturer's Written Instructions:
 - 3. Closeout Submittals in accordance with Specification Sections in Division One:
 - a. Warranty in accordance with Specification Section - WARRANTIES.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Material Qualifications:
 - a. All products of the membrane system shall meet the requirements of the Air Quality Control Standards in effect at the Project Site and at the time of application.
 - 2. Installer Qualifications:
 - a. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.

- b. Applicator shall have a copy of this Section of the Specifications and a copy of the Manufacturer's approved Specifications on the Work at all times.
- 3. Manufacturer/Supplier Qualifications:
 - a. Manufacturer's Representative shall be present at beginning of Work and shall inspect Work periodically during application.

B. Regulatory Requirements:

- 1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Meetings:

- 1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Inspect the substrates with the intent to coordinate the Work related to the membrane and to insure a watertight design.
 - b. Coordinate the work with all other related work.
 - c. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
- 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

- 1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage. Damaged products will not be accepted at final inspection.

B. Acceptance at Site:

- 1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.

C. Storage and Protection:

- 1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.5 PROJECT CONDITIONS

A. Environmental Requirements:

1. No application of fluid applied urethane membrane or flashing shall commence or proceed during inclement weather, or the threat of imminent precipitation.
2. All surfaces to receive the system shall be thoroughly dry and free of dew or frost.
3. Application temperatures are not limited except that materials shall be stored until time of mixing at temperatures above 60 degrees Fahrenheit to maintain a consistency suitable for mixing.

B. Existing Conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Field Measurements: Take and be responsible for field measurements as required. Prior to performing work report any significant differences between field dimensions and Drawings to Architect.

C. Inspection of Deck or Walls and Flashing Surfaces:

1. The Contractor shall examine all surfaces designated to receive the system and unacceptable surfaces shall be reported to the Architect.
2. Surfaces shall be slightly textured, but free of all voids, projections, fins, honey combing, and rock pockets.
3. Surfaces shall be free of contaminants such as, but not limited to oil, grease, paint, scale, cement laitances, curing compounds and similar materials.

1.6 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period Five (5) Years
 - 1) For fluid applied membrane waterproofing system, including labor and materials.

C. Installer's Warranty:

1. In accordance with the terms of the Specification Section - WARRANTIES
 - a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.

1. Specified product manufacturer:
 - a. GACO WESTERN #LM-60.
2. Specified accessory product manufacturers:
 - a. Urethane sealants:
 - 1) SIKA CORPORATION "SikaFlex 1A."
 - b. Protection Boards:
 - 1) Horizontal Protection Boards:
 - a) W.R. MEADOWS "Sealtight Protection Course – PC-2."
 - 2) Vertical Protection Boards:
 - a) Drainage Composite: JDR ENTERPRISES, INC. - "J-Drain 302."
 - b) Asphalt Impregnated: W.R. MEADOWS - "Sealtight Protection Course – PC-3"
 - c. Below Grade Membrane:
 - 1) GRACE "PrePrufe 300R" (or "PrePrufe 300LT").

B. Products from other manufacturers not listed must submit in accordance with Specification Section - PRODUCT SUBSTITUTIONS.

2.2 MATERIALS

A. Provide waterproofing materials recommended by manufacturer to be fully compatible with and able to develop bond to substrate under conditions of service and application required, as demonstrated by waterproofing manufacturer based on testing and field experience:

1. Compound waterproofing for vertical or horizontal application and slope of substrate indicated. Provide waterproofing with not less than 100 percent solids.

B. Two-component, solvent free polyurethane complying with performance and physical requirements of ASTM C 836 "Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course," and with manufacturer's printed physical requirements as certified by a qualified independent testing agency.

1. Specified product physical requirements:

<u>Property</u>	<u>ASTM TEST METHOD</u>	<u>VALUE</u>
Tensile	D412	175 psi

Property	ASTM TEST METHOD	VALUE
Elongation	D412	300 percent
Solids (by Volume)	-	100 percent
Water Vapor Permeability	E96	0.012 perm in.
Water absorption	D 47 21 days R.T.	1 percent maximum
Low Temperature	D746	Pass @ -50 degrees F.
Hardness, Shore A	D 2240	30
Tear resistance	D 524 Die C	30 pli

C. Below Grade Membrane:

1. Pre-applied Integrally Bonded Waterproofing Membrane: "Preprufe 300R" Membrane (or "Preprufe 300LT" Membrane for application temperatures between 25 degrees F and 60 degrees F) by GRACE CONSTRUCTION PRODUCTS, a 1.2 mm nominal thickness composite sheet membrane comprising 0.8 mm of high density polyethylene film, and layers of specialty formulated synthetic adhesive layers. The membrane shall form an integral and permanent bond to poured concrete to prevent water migration at the interface of the membrane and structural concrete.
2. Specified product physical requirements:

Property	ASTM TEST METHOD	VALUE
Thickness	D 3767 Method A	1.2 mm nominal
Lateral Water Migration Resistance	D 5385 Modified ¹	Pass at 71 m of hydrostatic head pressure
Low Temperature Flexibility	D 1970	Unaffected at -20 degrees F
Elongation	D 412 Modified ²	500 percent
Crack Cycling at -9.4 degrees F, 100 Cycles	C 836	Unaffected, Pass
Tensile Strength, Film	D 412	27.6 MPa (4,000 lbs/in ²)
Peel Adhesion to Concrete	D 903 Modified ³	880 N/m (5.0 lbs/in)
Lap Adhesion	D 1876 Modified ⁴	880 N/m (5.0 lbs/in)
Resistance to Hydrostatic Head	D 5385 Modified ⁵	71 m (231 ft)
Puncture Resistance	E 154	990 N (221 lbs)
Permeance	E 96 Method B	0.6 ng/Pa x s x m ² (0.01 perms)
Water Absorption	D 570	0.5 percent

a. Footnotes:

- 1) Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the blind side waterproofing membrane. A hydrostatic head pressure of 71 m (231 ft) of water is the limit of the apparatus.
- 2) Elongation of membrane is run at a rate of 50 mm (2 in) per minute.
- 3) Concrete is cast against the protective coating surface of the membrane and allowed to cure (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 50 mm (2 in) per minute at room temperature.

- 4) The test is conducted 15 minutes after the lap is formed as per manufacturer's instructions and run at a rate of 50 mm (2 in) per minute.
- 5) Hydrostatic Head tests are performed by casting concrete against the membrane with a lap. Before the concrete sets a 3 mm (0.125 in) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to a head of 71 m (231 ft) of water which is the limit of the apparatus.

2.3 MIXES

- A. Fluid applied membrane waterproofing shall be mixed a minimum of 5 minutes before applying, and in accordance with manufacturers recommendations.
1. Quantities over two (2) gallons require power mixing.

2.4 ACCESSORIES

- A. Flashing Materials:
1. Flashing: 60 mil neoprene sheet, uncured, non-staining.
 2. Flashing Adhesive: Manufacturer's written recommended bonding & splicing adhesive.
 3. Primer (For Metal Surfaces): Manufacturer's written recommended primer compatible with main waterproofing membrane materials, metal type to be bonded to, and air quality standards in the location where the project is located.
 4. Release Tape: 1" masking tape, unless otherwise noted.
 5. Urethane Sealant: As specified.
 6. Primer Sealer System:
 - a. For Lightweight Structural Concrete Substrate:
 - 1) Manufacturer's written recommended primer/sealer system compatible with main waterproofing membrane material and air quality standards in the location where the project is located.
 - b. For Structural Concrete Substrate:
 - 1) Manufacturer's written recommended primer/sealer system compatible with main waterproofing membrane material and air quality standards in the location where the project is located.
 7. Protection Boards:
 - a. Horizontal:
 - 1) Between Concrete Slabs: 1/8" thick x 4' x 8' panel.
 - a) Standard Duty multi-ply, semi-rigid board composed of mineral-fortified asphaltic core formed between a liner of asphalt-saturated felt and a glass mat liner which is weather-coated and covered with a polyethylene anti-stick sheet.
 - b) Backfill protection board only.
 - b. Vertical Drainage Composite: 1" thick.
 - 1) Core:
 - a) Color Black.
 - b) Compressive strength (ASTM D 1621) 30000 psf.
 - c) Thickness (ASTM D 1777) 0.22 inch.
 - d) Flow (ASTM D 4716) 5.5 gpm/ft. width.
 - 2) Fabric:
 - a) Flow (ASTM D 4491) 205 gpm/ft².

- b) Mullen Burst (ASTM D 3786) 285 psi.
 - c) Puncture (ASTM D 4833) 80 lbs.
 - d) U.V. Resistance (ASTM D 4355) Fully Stabilized.
 - e) Grab Tensile (ASTM D 4632) 120 lbs.
- c. Vertical Asphalt Impregnated (No drainage requirement) - 1/2" thick x 4' x 8' panel.
- 1) Asphalt Impregnated protection board
 - 2) Backfill protection board only.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions:

- 1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual that affect the execution of work under this specification section.
- 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
- 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:

- 1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:

- 1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface Preparation:

- 1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
- 2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
- 3. All control joints and non-moving cracks shall be treated prior to the application of the fluid applied membrane, over the main field of the deck.
 - a. All control joints and non-moving cracks shall be filled with fluid applied membrane and strip coated with 60 mils of fluid applied membrane extending for 3" on each side of such joints on cracks.
 - b. When coating the main field of the deck, the fluid applied membrane shall extend over these cracks and joints to obtain a total membrane thickness of 120 mils.
- 4. All moving cracks shall be treated prior to the application of the fluid applied membrane, over the main field of the deck.
 - a. Remove all loose chips of substrate along the edge of the crack.

- b. Install urethane sealant in the crack (where possible) and strike flush with the concrete surface.
 - c. All moving cracks shall be covered with 3" masking tape, centered over the crack and strip coated with 60 mils of fluid applied membrane extending 3" on each side of the tape.
 - d. When the main field of the deck is coated with fluid applied membrane, it shall extend over these cracks to obtain a total buildup at 120 mils over such cracks.
5. Priming and sealing:
- a. Primer as recommended by manufacturer, shall be roller applied at a rate recommended by the manufacturer for the system installed, and in accordance with the manufacturer's warranty requirements.
 - 1) If the primer is not installed over the entire deck surface in one day, do not overlap prior day's work when applying the primer.
 - 2) It would be preferable to leave a narrow uncoated area than to overlap subsequent days of application of the primer.
 - 3) Drying time for primer shall be in accordance with the manufacturer's written recommended drying times for degrees of temperature range shown on the manufacturer's written instructions.
 - b. Structural Grade Concrete and Concrete Masonry Units:
 - 1) When the porosity of the concrete is such that entrapped air may cause blisters or pinholes in the coating, the concrete surface shall be sealed with primer as recommended by manufacturer.
 - 2) The seal coat shall be applied by roller only.
 - 3) The seal coat shall be allowed to cure until such time that workmen applying the system can walk on it without damage to the coating.
 - 4) Seal coat shall not be left exposed without top coat for more than 48 hours. Should a longer time elapse, the seal coat shall be wiped with primer as recommended by manufacturer.
 - c. Lightweight Structural Grade Concrete Substrate:
 - 1) All concrete decks shall be coated with primer as recommended by manufacturer.
 - d. Metal Surfaces:
 - 1) Metal surfaces shall be primed with primer at a rate recommended by the manufacturer for the system installed, and in accordance with the manufacturer's warranty requirements.
 - 2) Primer shall be allowed to dry in accordance with the manufacturer's written recommended drying times before overcoating with the fluid applied membrane waterproofing.

3.3 INSTALLATION

A. General:

- 1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
 - a. Fluid applied membrane shall be applied in two (2) coats at the rate of 51 square feet per gallon per coat, resulting in an average dry mil thickness of 30 mils for each coat - sixty (60) mils average total thickness.
 - b. For application on vertical surfaces, use manufacturers recommended fluid applied membrane for vertical surfaces.

- c. For application on horizontal surfaces, use manufacturers recommended fluid applied membrane for horizontal surfaces.
 - d. Fluid applied membrane shall overlap all sheet membranes a minimum of 3".
 - e. Sheet membranes shall be coated with recommended adhesive in areas where fluid applied membrane will overlap it.
 - f. Newly applied membrane shall overlap cured membrane a minimum of 3".
 - g. If cured material has been in place for 48 hours or more, it shall be wiped with manufacturers recommended reactivating agent in compliance with all air quality requirements before overlapping with freshly applied material.
2. In accordance with Regulatory Requirements.
 3. Set plumb, level, and square.
 4. Perform all testing prior to installation of protection board.

B. Layout:

1. Protection board layout lines shall be straight and true.
2. All fluid applied membrane installed below grade shall be covered with protection panel system.
 - a. The protection panel will provide drainage against the wall and also protect the waterproof membrane during backfill operations.
3. Attach directly to waterproof membrane using manufacturer's written recommended adhesive, and in accordance with the manufacturer's written requirements.
 - a. Press panel into place over the cured waterproofing membrane.
 - b. Press panel firmly on entire surface to ensure good adhesive bond.
 - c. Stagger vertical joints and butt panels tightly together.
 - d. Field Cutting; Use a hand saw, hot wire or hot knife.
 - e. Cover weep holes with galvanized metal or stainless steel wire screen to support and retain panel.
 - f. Connect to perimeter drain pipe with gravel in accordance with manufacturer's written recommendations.
 - g. Cover gravel with geotextile fabric in accordance with manufacturer recommendations.

3.4 FIELD QUALITY CONTROL

A. Site Tests:

1. Water Testing:
 - a. All horizontal areas should be water tested prior to the installation of a wear course.
 - b. No area shall be water tested within 48 hours after application.
 - c. Water testing shall include flooding of the entire deck either by section or entirely for a minimum period of 24 hours.
 - d. Any area where leaks occur shall be drained, thoroughly dried, repaired, and then retested.
 - e. Installation of the wear course shall not start until such time as the membrane is leak-free and has been accepted by the owner or his representative.

B. Inspection:

1. Schedule inspections and notify the Architect, Owner's Inspector and any regulatory agencies of the time at least 48 hours prior to the inspection.

3.5 CLEANING

- A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
 - 1. Leave area level and free of any ruts or debris. Appearance of earth surface shall be equal to or better than adjacent undisturbed surfaces.
 - 2. Clean any soiled surfaces immediately.
 - 3. Finish shall be clean and ready for the application of any additional finishes.
 - 4. In accordance with manufacturer's written instructions and recommendations.

3.6 PROTECTION

- A. Protection from Weather:
 - 1. Protect newly installed work from freezing for 24 hours after erection, installation or application.
 - 2. Until such time as the membrane has been covered with backfill or protective wear course, the area shall be kept free of all traffic and other trades.
- B. Protection from Traffic:
 - 1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 071850 – VAPOR-ALKALINITY CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment, testing and services necessary to:
 - a. Completely install all Vapor-Alkalinity Control 100 percent solids epoxy membrane materials, accessories and other related items necessary to control for water vapor and alkalinity in existing or new concrete slabs for the Project.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS (Including BID FORM)
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 03 30 00 CAST-IN-PLACE CONCRETE
 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
- C. Cost of Work:
1. The entire cost for providing the vapor-alkalinity control specified under this Section shall be listed on the BID FORM as a Line Item and included as a part of the Base Bid. Refer to the BID FORM.
 2. If it is determined by way of testing, and it is agreed to by the Owner, Architect, Contractor, and the Flooring Installer, that the work of this Section is not required, then this Work (or a portion of this Work agreed to by the Owner, Architect and the Contractor) for the Installation of the Vapor-Alkalinity Control Membrane System will be deleted from the Project by the way of a Change Order, and the Contract Sum shall be reduced accordingly.

1.2 REFERENCES

- A. Standards:
1. In accordance with the following standards:
 - a. ACI American Concrete Institute
 - 1) ACI Committee Report 201 "Guide to Durable Concrete"
 - b. ASTM American Society for Testing Materials International

1.3 DEFINITIONS

- A. Membrane System: "Water Vapor-Alkalinity Membrane System."
- B. New Concrete Slab: Any concrete slab poured after the signing of the Contract for this Project, regardless of the duration of the construction period.
- C. Existing Concrete Slabs: Any slabs existing (or poured) prior to this Project.

- D. pH: Alkalinity.
- E. RH: Relative Humidity.
- F. MVER: Moisture Vapor Emission Rate.
- G. Hg: Mercury.

1.4 SYSTEM DESCRIPTION

- A. The Moisture Vapor Control System shall be specifically formulated and marketed for concrete floor slab moisture vapor and pH control.
- B. Membrane System Performance Requirements: It is the intention of this section to form a guide for a complete membrane system. Any items not specifically noted but necessary for a complete membrane system shall be provided under this section. Membrane System shall comply with the following:
 - 1. Shall control alkalinity for a long term maximum resistance of pH 14 per pH Testing of ASTM F 710 "Preparing Concrete Floors to Receive Resilient Flooring."
 - 2. Shall control vapor transmission up to and including 100 percent readings per RH Testing of ASTM F 2170 "Determining Relative Humidity in Concrete Floor Slabs Using *in situ* Probes".
 - 3. Perm Rate Results (net perms - grains /hr/sq.ft. in 1 inch of Hg) of the membrane system shall not exceed:
 - a. New Concrete Slabs: 0.09 grains/sq. ft./hour in 1 inch of Hg or less per ASTM E 96 "Water Vapor Transmission of Materials" per the Water Method for new concrete slabs.
 - b. Existing Concrete Slabs: 0.05 grains/sq. ft./hour in 1 inch of Hg or less per ASTM E 96 "Water Vapor Transmission of Materials" per the Water Method for renovation work on existing slabs.
 - 4. Compatible with all types of floor covering products and systems specified for this project.
 - 5. Independently tested with certified results.
 - 6. Contain no silicate or water/alkaline soluble compounds.
 - 7. Capable of the following in an environment of constant water vapor and water exposure:
 - a. System shall be capable of curing well when water saturation of the surface underneath coatings can begin within a short period of time depending on the amount of osmotic water/moisture permeating through the concrete.
 - b. Rapid adhesion to the substrate without jeopardizing the long term bonding performance.
 - 8. Sufficient density to avoid water vapor damage to other adhered systems.
 - 9. Resistant to most commonly encountered acids/solvents in case of topical exposure (spills).

1.5 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 - 1. Product Data:
 - a. Manufacturer's Data for each type of product specified.

2. Quality Assurance/Control:
 - a. Test Reports:
 - 1) Independent Testing Laboratory test results for RH (relative humidity) in concrete.
 - 2) Independent Testing Laboratory test results for pH on concrete.
 - 3) Contractor test results for Perm Rating of the Membrane System that the net perms test results shall be submitted with verification that lab applied the manufacturer's product to the test samples.
 - b. Manufacturer's Instructions:
 - 1) Written installation instructions.
 - c. Manufacturer's Field Reports:
 - 1) Written field report detailing installation observations.
 - 2) Final field report after curing indicating installation was performed properly.
 - d. Qualification Statements
 - 1) Manufacturer's Membrane System Performance requirement letter.
 - 2) List of Previous Projects.
 - 3) Manufacturer's Installer Certification.
 - 4) Manufacturer's Duration of Experience.
3. Closeout Submittals:
 - a. In accordance with Specification Section – PROJECT CLOSEOUT.
 - b. In accordance with this specification and with Specification Section – WARRANTIES.

1.6 QUALITY ASSURANCE

- A. Qualifications:
 1. Material Qualifications:
 - a. All items shall be within the Membrane System Performance Requirements specified earlier within this specification section.
 - b. Provide list of at least three (3) projects available for inspection employing same vapor-alkalinity control system(s) within the last ten (10) years, within the same climate zone.
 2. Installer Qualifications:
 - a. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
 3. Manufacturer's Qualifications:
 - a. Firm regularly engaged in the business and manufacture of vapor emission and alkalinity control installations of similar size and complexity with the system proposed for use, and have had experience for at least ten (10) years of manufacturing water-vapor reduction systems with the product submitted.
- B. Regulatory Requirements:
 1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

- C. Mock-Up:
 - 1. Install the Moisture Control System in a minimum 100 sq. ft. mock-up area, using the same methods, laborers and equipment that will be used for the entire installation. Test tensile bond strength of the moisture mitigation system to the concrete substrate following ASTM Test Method D 7234. The results shall be equal to or greater than 200 psi with failure in the concrete before proceeding with installation of the moisture control system.

- D. Meetings:
 - 1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
 - c. Review delivery, storage, and handling procedures.
 - d. Review project conditions.
 - e. Review condition of concrete slabs on grade.
 - 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
 - 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Acceptance at Site:
 - 1. Products must be in manufacturer's original unopened containers with labels indicating brand name and product name.
 - 2. Damaged products will not be accepted.

- B. Storage and protection:
 - 1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units, in a locked, clean and neat, well ventilated area.
 - a. Cover material with protective water proof covering providing for adequate air circulation and ventilation.
 - b. Empty containers shall not be removed from the site, unless approved by the Architect.

1.8 PROJECT CONDITIONS

- A. Environmental requirements:
 - 1. Temperature:

- a. Maintain ambient temperature in all spaces to receive independent testing and membrane system installation between sixty-five (65) degrees Fahrenheit and seventy-eight (78) degrees Fahrenheit for seven (7) days prior, during, and after installation.
 - b. Inform the Owner of ambient temperature in space to receive independent testing and membrane system installation and maintain until Substantial Completion and turn-over of the building or facility to the Owner.
2. Ventilation:
 - a. During membrane system installation provide continuous ventilation and indirect air movement at all times during application and curing process.

B. Existing conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Concrete surfaces shall have cured for not less than twenty-eight (28) days before independent testing.
3. Not less than seven (7) days shall have passed since surfaces were last wet.

1.9 WARRANTY

A. Contractor's General Warranty:

1. In accordance with specification section - WARRANTIES

B. Manufacturer's Warranty:

1. In accordance with manufacturer's written standard warranty.
 - a. Manufacturer's warranty shall cover against water vapor transmission or out of range levels of alkalinity failure through concrete slabs and includes all labor and material costs for replacement of all products installed over the membrane system.
 - b. Warranty period Fifteen (15) Years.

C. Installer's Warranty:

1. In accordance with the terms of Specification Section – WARRANTIES:
 - a. Warranty period Five (5) Years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.

1. Membrane System for New Concrete Slabs - Specified product manufacturer:

- a. KOESTER AMERICAN CORP. "VAP I 2000 SYSTEM"
 - b. Approved equivalent manufacturers:
 - 1) ALLIED CONSTRUCTION TECHNOLOGY 2170.
 - 2) MAPEI "Planiseal VS."
 2. Core Testing Repair Product:
 - a. CTS CEMENT "RAPID SET CEMENT"
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. General:
1. Membrane System shall be the product of one manufacturer.
- B. Membrane System for New Concrete Slab Substrates: One (1) Coat, epoxy 100 percent solids system, containing specifically formulated chemicals and resins complying with the Performance Requirements specified. No silicate or water based formulations are allowed.
1. Pot Life 12 minutes.
 2. Cure-Time 12 hours.
 3. Solid Content 100 percent.
 4. VOC, mixed Less than 10 g/L.
 5. Flash Point Greater than 200 degrees F.
 6. Storage Between 50 degrees F - 90 degrees F.
 7. Shelf Life 1 Year minimum in original sealed container.
- C. Membrane System for Existing Concrete Slab Substrates: One (1) Coat, epoxy 100 percent solids fast setting system, containing specifically formulated chemicals and resins complying with the Performance Requirements specified. No silicate or water based formulations are allowed.
1. Pot Life 12 minutes.
 2. Cure-Time 4 hours.
 3. Solid Content 100 percent.
 4. VOC, mixed Less than 10 g/L.
 5. Flash Point Greater than 200 degrees F.
 6. Storage Between 50 degrees F - 90 degrees F.
 7. Shelf Life 1 Year minimum in original sealed container.

2.3 ACCESSORIES

- A. Bonding Material (if required): Provide membrane manufacturer's written recommended bonding emulsion materials compatible with the membrane system.
- B. Crack and Joint Filler:
1. Provide membrane system manufacturer's written recommended crack and joint materials compatible with the membrane system.

2.4 MIXES

- A. Vapor-Alkalinity Control Membrane System:
1. Use clean containers.
 2. Mix thoroughly as per manufacturer's written requirements to obtain a homogeneous mixture.
 - a. Use a low speed motor less than 400 rpm and a two bladed "jiffy mixing blade" only. DO NOT AERATE! Mix ratios are measured by volume.
 - b. Specified membrane system shall have its components mixed at a ratio of 2.4:1.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
1. Preparation shall not begin until the Owner, Architect, and Contractor have reviewed independent testing laboratory results of Alkalinity and Relative Humidity testing and have informed the membrane system manufacturer and installer of areas where the membrane system is to be installed.
 2. Prior to the execution (preparation) of the work under this specification section, the Owner's representative shall inspect the installed work executed under other sections of this Project Manual that affect the execution of work under this specification section.
 - a. Membrane System Installer to investigate and inform the membrane system manufacturer if Alkali-Silica Reaction is present, and/or oil contamination, concrete additives (using chlorides), or any other soluble compounds that can contaminate surfaces have been used in any concrete mix, or is present in the existing concrete substrate.
 3. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 4. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
- B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of the surrounding environment, and other damage from work under this specification section.
- C. Surface preparation:
1. Comply with ASTM F 3010 "Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings."

2. After the Testing Laboratory removal of all RH probes, fill all RH Test holes with core repair product in accordance with membrane manufacturer's written recommendations, and allow curing before any other cleaning occurs.
3. Clean all surfaces to receive membrane system.
4. "Shotblast" all floors and clean surfaces with a dust contained vacuum to remove all residue off the substrate to a minimum CSP (Concrete Surface Profile) of 3. Shotblast existing areas to a minimum of CSP 4. Systems introducing water or acids to the floor systems (such as "Hydrablasting" or "Acid Etching") are NOT ALLOWED.
 - a. Grinding floor areas is only allowed when floor areas are inaccessible by "Shotblasting".
 - 1) Grind to a CSP as recommended in writing by the membrane system manufacturer, but in no cases less than 3.
 - a) Existing slabs shall be no less than 4.
 - 2) Where surface profiles require (because of silicate or other bond breaker film applications), grind to a higher level of CSP, as required in writing by the membrane system manufacturer for removal of film items not compatible with the system membrane.
 - b. Protect electrical or mechanical equipment items in place from dust and particulate residue that could impede their proper operation.
 - c. Remove ALL defective materials and foreign matter such as dust, adhesives, leveling compounds, paint, dirt, floor hardeners, bond breakers, oil, grease, curing agents, form release agents, efflorescence, laitance, "shotblast" bb's, etc.
 - d. Remove, after "shotblasting," leaving no reinforcing fibers (if any) left on the concrete surfaces.
 - 1) Reinforcing fibers must be burned off, scraped and vacuumed.
5. Repair all cracks, expansion joint, control joints, and open surface honeycombs and fill in accordance with crack and joint filler manufacturer's written recommendations.
 - a. Mix with silica sand for large cracks or voids.
6. Provide an uncontaminated, absorptive, sound surface.

3.3 APPLICATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Verify that required repairs and fills are complete, cured, and dry before application.

B. Assistance:

1. Application shall be in direct consultation and review of manufacturer's representative.

C. System Application:

1. The coverage rate for the provided system shall be based on the surface texture and porosity of the substrates as well as the measured level of moisture from the examination of the substrates after surface preparation, and in accordance with manufacturer's written instructions. Approximate minimum coverage of the specified membrane system relative to existing levels of moisture vapor after surface preparation are as follows:
 - a. New concrete slabs 150 sq. ft. / gal.

- b. Existing concrete slabs 130 sq. ft. / gal.
- c. Apply one coat of the specified system at the written recommended rates (see above) using a squeegee and or a 3/8 inch nap roller leaving NO areas untreated.
- d. Allow the substrate to cure a minimum of:
 - 1) New concrete slabs: 12 hours before installing underlayment or flooring system.
 - 2) Existing concrete slabs: 4 hours before installing underlayment or flooring system.

3.4 FIELD QUALITY CONTROL

A. Site Tests:

- 1. Prior to the execution (preparation) of the work of this specification section, the Project Inspector will arrange with the Independent Testing Laboratory to perform the following tests:
 - a. Alkalinity Testing per ASTM F 710 "Preparing Concrete Floors to Receive Resilient Flooring."
 - b. Relative Humidity Testing per ASTM F 2170 "Determining Relative Humidity in Concrete Floor Slabs Using *in situ* Probes."
- 2. Test only concrete slabs scheduled to receive floor coverings.
- 3. Test only when concrete floor slabs have cured a minimum of 28 days.
- 4. Test only when the concrete slabs have been acclimated to final environmental conditions as specified in the Article PROJECT CONDITIONS within this Specification Section.

B. Inspection:

- 1. Schedule inspections and notify the Architect, Project Inspector, and any other regulatory agencies of the time at least 48 hours prior to the inspection.
- 2. No work shall proceed without the inspections of the Project Inspector.

C. Manufacturer's Field Services:

- 1. Membrane System Manufacturer shall field verify and report on observations of system application per manufacturer's recommendations during installation.
- 2. Membrane System Manufacturer shall issue a Final Field Report, after curing, indicating installation was completed per manufacturer's recommendations.

3.5 CLEANING

A. Cleaning:

- 1. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
- 2. Clean any soiled surfaces immediately.
- 3. Remove all debris resulting from specified system installation from project area.
- 4. Finish shall be clean and ready for the application of any additional finishes.
- 5. Clean all tools and equipment as recommended in writing by the manufacturer.

3.6 PROTECTION

A. Protection:

**VAPOR-ALKALINITY
CONTROL**

2180

1. Protect membrane system during specified cure periods from any kind of traffic, topical water, and contaminants.

END OF SECTION

SECTION 072100 – INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
- B. Provide all material, labor, equipment and services necessary to completely install all Insulation, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- C. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 04 22 00 CONCRETE MASONRY UNITS
 - 4. 05 12 00 STEEL AND FABRICATIONS
 - 5. 05 30 00 METAL DECK
 - 6. 06 10 00 ROUGH CARPENTRY
 - 7. 07 60 00 SHEET METAL
 - 8. 09 22 16 METAL FRAMING
 - 9. 09 24 00 CEMENT PLASTER
 - 10. 09 29 00 GYPSUM BOARD
 - 11. 09 50 00 ACOUSTICAL CEILINGS
 - 12. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 13. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. Standards:
 - 1. In accordance with the following standards:
 - a. MIMA Mineral Insulation Manufacturers Association
 - b. NFPA National Fire Protection Association
 - c. TIMA Thermal Insulation Manufacturers Association

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 - 1. Product Data.
 - a. Product Data on materials and accessories.
 - 2. Quality Assurance/Control Submittals:
 - a. Manufacturer's Written Instructions:
 - 1) Submit three (3) copies of manufacturer's written instructions.
 - 3. Closeout Submittals in accordance with the following:
 - a. Warranty in accordance with Specification Section - WARRANTIES.

1.4 QUALITY ASSURANCE

- A. In accordance with California Quality Standards.
- B. The R values for the insulation materials shall be in accordance with "The Standard Mineral Wool Building Insulation" latest Edition of the MIMA.
- C. Regulatory Requirements:
 - 1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. ASTM American Society for Testing and Materials

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Storage of Materials:
 - 1. All Materials shall be delivered and stored in original unopened packages with manufacturer's name and contents legibly indicated. Materials shall be stored in a dry place, and protected from damage.

1.6 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section - WARRANTIES
 - a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified blanket insulation product manufacturer:
 - a. OWENS CORNING
 - b. Acceptable alternative manufacturers:

- 1) CERTAINTEED
 - 2) JOHNS MANVILLE CORPORATION
 2. Specified rigid roof board insulation product manufacturer:
 - a. RMAX (a SIKA company) "Multi-Max FA-3."
 - b. Acceptable Alternative Manufacturers:
 - 1) ATLAS.
 - 2) JOHNS MANVILLE CORPORATION.
 - 3) TREMCO.
 3. Specified rigid wall board insulation product manufacturer:
 - a. RMAX (a SIKA company) "TSX-8500"
 - b. Acceptable Alternative Manufacturers:
 - 1) ATLAS.
 - 2) JOHNS MANVILLE CORPORATION.
 - 3) TREMCO.
 4. Specified Foamed-In-Place Insulation product manufacturer:
 - a. DOW CHEMICAL "Great Stuff Pro."
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Thermal Blanket:
1. Construction in accordance with the following:
 - a. Type I: Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with a maximum flame-spread and smoke-developed indices of 25 and 50, respectively, per ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials"; passing ASTM E 136 "Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C," for combustion characteristics.
 - 1) Unless otherwise noted, blankets without vapor-retarder membrane coverings, used in Interior partitions not subject to moisture.
 - b. Type II: Kraft-faced, Glass-Fiber Blanket Insulation: ASTM C 665 "Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing," Type II (non-reflective faced), ASTM E 84 Class C (faced surface not rated for flame propagation); Category I (membrane is a vapor barrier).
 - 1) Unless otherwise noted, this type of insulation should only be used in conditions not "subject to view" (enclosed cavities) or in attics where a finished ceiling is provided and the attic is not used as a return air plenum.
 - c. Type III: Reinforced-Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665 "Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing," Type III (reflective faced), ASTM E 84 Class A (faced surface with a foil-scrim or foil-scrim-kraft facing)
 - 1) Unless otherwise noted, this product shall be used when the attic (although enclosed by a finished ceiling) is used as a return air plenum, or used in "exposed-to-view" exterior and interior walls and ceilings or attics subject to moisture and fire-rated conditions.
 2. Thermal Resistance (R) values required (minimum) for blanket insulation, unless otherwise indicated on the drawings:
 - a. Roof Blanket Insulation: R-30.

- b. Wall Blanket Insulation: R-19.
 - 3. Thickness: No more than will fit into the space available without compressing. Where insulation is confined between finishes, which would compress the material, high efficiency insulation shall be used to provide the required resistance value.
- B. Rigid Board:
- 1. Roof Board:
 - a. In accordance with:
 - 1) ASTM C 1289 "Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board," Type 2, Class 1, isocyanurate with front and back glass fiber/organic mat paper-facers (balanced panel), conditioned "R" value of 8.6 per 1.5 inches minimum, in accordance with ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials," and ASTM D 1621 "Test method for Compressive Properties of Rigid Cellular Plastics."
 - a) Flame Spread Index Maximum, core: 25 or less.
 - b) Smoke Density Developed Index Maximum, core: 450 or less.
 - c) Compressive strength: 20 PSI.
 - d) 4' x 4' or 4' x 8' panels.
 - 2. Wall Board:
 - a. Isocyanurate with front and back aluminum foil-faced (balanced panel).
 - b. General: Tested to meet NFPA 285 "Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components."
 - c. In accordance with:
 - 1) ASTM C 1289 "Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board," Type 1, Class 1.
 - 2) ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials," and ASTM D 1621 "Test method for Compressive Properties of Rigid Cellular Plastics."
 - d. Properties:
 - 1) NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components Pass.
 - 2) Flame Spread Index Maximum, ASTM E 84: 25 or less.
 - 3) Smoke Density Developed Index Maximum, ASTM E 84: 450 or less.
 - 4) Compressive strength: 25 PSI.
 - 5) 4' x 4' or 4' x 8' panels.
 - 6) R value per inch: 6.0.
- C. Foamed-In-Place Insulation:
- 1. Low Pressure Type: Semi-flexible soft, single-component polyurethane sealant, to CAN/ULC-S710.1, and having the following properties:
 - a. Core Density (ASTM D 1622) 1.7 pcf.
 - b. Fire Resistance (ASTM E 84) Flame Spread = 10, Smoke Developed = 20.
 - c. Color: Yellow.
 - d. Cure Time: Approximately 12 hours.
 - e. Tack Free Time: 6 - 9 minutes.
 - f. Applicator: Gun applied.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. All building(s) shall have a complete thermal envelope of thermal blanket or rigid board insulation.
 - a. Do not install insulation until the construction has progressed to the point that inclement weather will not damage or wet the insulation material.
 - b. Install in accordance with manufacturer's written recommendations.
 - c. Insulation shall fit snugly between framing members without voids. Fully insulate all areas between all framing members, cutting and fitting as required.
 - d. Attach insulation to inside face of framing members.
 - 1) Wood Framing: Friction fit to keep from falling down within wall cavity. Attach with Hammer Staples at 6 inches on center with minimum staple penetration of 3/8 inch when insulation has a membrane facing.
 - 2) Metal Framing: Friction fit to keep from falling down within the cavity and use line wire across metal studs. Omit wire and spot tape with FSK Tape when insulation has a membrane facing.
 - e. Vapor-Retarder Membrane: Shall be continuous and without unnecessary joints.
 - 1) At roof structure and exterior walls, after securing the insulation facing flanges, provide FSK Tape over all of the insulation facing butt joints and all overlapping facing flanges, so as to create a continuous vapor-retarder membrane at underside of the roof deck and inside of walls.
 - 2) Patch all tears, rips and holes in the vapor-retarder membrane.
 - f. Cut and fit insulation material around pipes, conduits and outlet boxes, as necessary to maintain the full integrity of the insulation.

B. At Roof Framing:

1. Install thermal roof blanket Insulation between all exterior roof framing members.
 - a. Wood Framing: Attach wire to framing with staples with minimum staple penetration of 5/8 inch.

C. At Wall Framing: Install thermal wall blanket insulation between all exterior wall framing members.

D. Rigid Board Insulation:

1. Install per manufacturer's written recommendations.
2. Wall Board: Tape all edges as part of the rigid board system.

END OF SECTION

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SECTION 074113 - METAL SHINGLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specifications Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all Metal Shingles materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - a. Metal shingles.{METAL SHINGLES}
 - b. Underlayment materials{UNDERLAYMENT MATERIALS}.
 - c. Sheet metal flashing and trim.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 2. 03 11 01 CONCRETE FORMWORK
 - 3. 03 30 00 CAST-IN-PLACE CONCRETE
 - 4. 04 21 13 BRICK MASONRY UNITS
 - 5. 04 21 30 THIN BRICK VENEER
 - 6. 04 22 00 CONCRETE MASONRY UNITS
 - 7. 05 12 00 STEEL AND FABRICATIONS
 - 8. 05 30 00 METAL DECK
 - 9. 07 21 00 INSULATION
 - 10. 07 51 13 BUILT-UP ROOFING
 - 11. 07 60 00 SHEET METAL
 - 12. 07 72 00 ROOF ACCESSORIES
 - 13. 07 95 00 EXPANSION JOINTS
 - 14. 09 22 16 METAL FRAMING
 - 15. 09 91 00 PAINTING
 - 16. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.3 REFERENCES

- A. Standards:
 - 1. In accordance with the following standards:

1.4 SUBMITTALS

- A. General: Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

- B. Coordination Drawings:
 - 1. Submit installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.
 - C. Product Data:
 - 1. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
 - 2. Submit manufacturer's standard color range for selection by the Architect.
 - 3. Provide construction detail for pipe penetration details at roof jack, pipe vents and flues.
 - D. Shop Drawings.
 - 1. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
 - E. Samples.
 - 1. Metal Shingles:
 - a. Provide 24 inch square sample of each color and pattern selected.
 - 2. Accessories:
 - a. Provide 6 inch lineal samples of each piece of trim material specified.
 - F. Quality Assurance/Control Submittals:
 - 1. Manufacturer's Instructions:
 - a. Submit manufacturer's written instructions.
 - G. Closeout Submittals in accordance with the following:
 - 1. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - 2. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - 3. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
 - 4. Warranty in accordance with Specification Section - WARRANTIES.
- 1.5 QUALITY ASSURANCE
- A. Qualifications:
 - 1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - 2. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products, similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
 - B. Regulatory Requirements:
 - 1. In accordance with Specification Section - REGULATORY REQUIREMENTS.
 - C. Certificates:
 - 1. Provide a letter on Contractor's Letterhead certifying work provided meets or exceeds the requirements of this Section.

- D. Field Samples:
1. Provide one complete coating system for each color, gloss and texture required. When approved, the sample panel areas will be deemed incorporated into the Project and will serve as the standards by which the subsequent work of this section will be judged.
- E. Meetings:
1. Pre-Construction:
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper construction of work.
 - c. Review structural load limitations of existing structure.
 - d. Review areas where existing construction is to remain and requires protection.
 2. Pre-Installation:
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work.
 3. Progress:
 - a. Review for proper work progress.
 - b. Identify any problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
 4. Completion: Scheduled by the Contactor upon proper completion of the work.
 - a. Inspect and identify any problems.
 - b. Establish method and procedures to maintain protections while progressing to project completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
- B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
 2. Damaged products will not be accepted.
- C. Storage and protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 PROJECT CONDITIONS

- A. Environmental requirements:
1. Dust control: Perform work in a manner as to minimize the spread of dust and flying particles. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.
 2. Burning: No burning will be allowed on-site.

3. Rain: The work under this section shall not be started or maintained under threat of rain unless the work is not affected by the rain.
4. Temperature: temperature of area to receive products at not less than (40) degrees Fahrenheit.
5. Humidity: per manufacturer's requirements.

B. Existing Conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.8 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period Fifty (50) Years.
 - 1) 120 mph Wind Warranty.
 - 2) Hail Impact Warranty.
 - 3) Class A Fire Rated System.

C. Installer's Warranty:

1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period One (1) Year.

1.9 MAINTENANCE

A. Extra Materials:

1. Provide an additional 1 percent of installed roof tiles, but not less than one full square, for Owner's use in roof maintenance.
2. Furnish extra materials packaged with protective covering storage and identified with labels clearly describing contents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.

1. Specified product manufacturer:
 - a. WESTLAKE ROYAL ROOFING "BARREL VAULT TILE PANELS."
 - b. Acceptable alternative manufacturers:
 - 1) DECRA Roofing Systems, Inc. "DECRA Villa Tile."
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Coated Steel: ASTM A792 "Standard Specification For Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated By The Hot-Dip Process" Grade 33 with an AZ 50 class, hot-dipped aluminum-zinc alloy coating and a thickness of 0.017-inch. Exposed surface is covered by pressed colored stone granules embedded in an acrylic resin base coating, followed with a clear acrylic glaze. Weight of coated steel is 1.3 pounds per square foot.

2.3 MANUFACTURED UNITS

- A. Stone Coated Panels:
 1. General:
 - a. Panel Evaluations: International Code Council (ICC), Brea California, Report No: ESR 3012.
 2. Barrel Vault Tile Panels: Resembling Spanish clay S-tile, 16-inches wide by 45-inches long, with an installed exposure of 14-inches by 42-inches. Leading edge of each panel is turned down 1-inch to create an overlapping weather edge. Side laps are 2-inches. Color as selected from Manufacturer's line of available colors.

2.4 ACCESSORIES

- A. Battens & Counterbattens:
 1. Hat Shaped Steel Batten:
 - a. Galvanized G-60 per ASTM A123 "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products."
 - b. Dimensions as indicated on Contract Documents.
- B. Hips, Ridges, and Rakes: "Unified Steel," Aluminum-Zinc Alloy Coated Steel sheet, nominal 0.0170 inches. Pressure formed to match roofing material, color, and finish to match panels.
 1. Cap Mission to match Barrel-Vault Tile.
- C. Sheet Metal Materials: Aluminum-zinc Alloy Coated Steel sheet, ASTM A 792 "Standard Specification For Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated By The Hot-Dip Process," color and surface finish matching roof panels.
- D. End Cap: "Unified Steel" End Disc Aluminum-Zinc Alloy Coated Steel sheet, nominal 0.0170-inch. Circular cap to match roofing material, color, and finish to match panels. To be applied at open end of hip and ridge at eave.
- E. Flashing: Trim to be of same material, panel profile and color as roof panels.

- F. Nails: Corrosion resistant full, flat head, 0.131-inch ring shanked, nails of sufficient length to penetrate substrate 1 inch minimum, finish color black.
- G. Screws: Manufacturer's minimum # 9 by 2-1/2-inch long corrosion resistant steel, 1/4-inch hex head screws. Screws colored coat to match panel color. Capable of resisting a minimum 1,000-hour salt spray in accordance with ASTM B 117 "Standard Practice For Operating Salt Spray (Fog) Apparatus."
- H. Panel Fasteners:
 - 1. Batten Screws: Minimum # 10 by 2-inches long minimum, 1/4"-inch hex head screws.
 - a. Screws colored coat to match panel color.
 - b. Use color matched stainless-steel screws for Coastal Regions/Salt Spray installations.
 - 2. Nails: Full, flat head 0.131-inch ring shanked, 8d box of nails, of sufficient length to penetrate substrate 1 inch minimum, finish color black.
- I. Valley and other Flashings: Aluminum zinc alloy coated sheet ASTM A792 "Standard Specification For Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated By The Hot-Dip Process" or G-90 Galvanized. Do not use copper and lead flashings due to metal incompatibility.
- J. Underlayment: "Metal Seal" or ASTM D1970 "Standard Specification For Self-Adhering Polymer Modified Bituminous Sheet Materials Used As Steep Roofing Underlayment For Ice Dam Protection"; self-adhering, polymer-modified, bituminous sheet underlayment; 1 mm thick. Provide primer when recommended by underlayment manufacturer.
- K. Sealant: One-part elastomeric polyurethane, sealant conforming to ASTM C920 "Standard Specification For Elastomeric Joint Sealants." Where sealant will be exposed, provide color to match panels.
- L. Elastomeric Pipe Sleeve Covers: EPDM elastomeric pipe and penetration flashing, "Master Flash" or equivalent.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
 - 1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affects the execution of work under this specification section.
 - 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 - 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Coordination:

1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
2. Coordinate with installation of gutters, vents, and other adjoining work to ensure proper sequencing. Do not install roofing materials until all vent stacks and other penetrations through roof sheathing have been installed and securely fastened.
3. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

B. Protection:

1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:

1. Prepare surface in accordance with manufacturer's instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

B. Layout:

1. Lines shall be straight and true.

3.4 INSTALLATION OF UNDERLAYMENT MATERIALS {UNDERLAYMENT MATERIALS}

Underlayments installed parallel to eaves are installed perpendicular to sloped roof deck.
Underlayments installed parallel to the rake are installed parallel to sloped roof deck.

- A. Comply with metal shingle and underlayment manufacturers' written installation instructions and with recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" applicable to products and applications indicated unless more stringent requirements are specified in this Section or indicated on Drawings.

B. Self-Adhering, Polymer-Modified Bitumen Sheet: Install, wrinkle free, on roof deck. {SELF-ADHERING, POLYMER-MODIFIED BITUMEN SHEET}

1. Comply with low-temperature installation restrictions of underlayment manufacturer.
2. Install lapped in direction that sheds water.
 - a. Lap sides not less than 4 inches (102 mm).
 - b. Lap ends not less than 6 inches (152 mm), staggered 24 inches (610 mm) between succeeding courses.
 - c. Roll laps with roller.

Retain first subparagraph below if primer is required to enhance adhesion to concrete and masonry surfaces, such as chimneys or walls, and metal surfaces, such as valley flashing.

3. Prime concrete and masonry surfaces to receive self-adhering sheet underlayment.

Retain "Single-Layer Installation" Subparagraph below if self-adhering, polymer-modified bitumen sheet covers the entire roof deck.

4. Single-Layer Installation: Install over entire roof deck.

Retain "Water and Ice-Dam Protection Installation" Subparagraph below if a layer of self-adhering, polymer-modified bitumen sheet partially covers roof deck in areas vulnerable to moisture penetration; revise to suit Project.

5. Water and Ice-Dam Protection Installation: Install where indicated on Drawings.

Retain one or more of first eight subparagraphs below if locations are not indicated on Drawings. Revise to suit Project.

Verify requirements of authorities having jurisdiction for valley underlayment.

6. Cover underlayment within seven days.

Retain "Valley Underlayment" Paragraph below if required and if installing self-adhering, polymer-modified bitumen sheet is not specified for water and ice-dam protection at valleys. Paragraph is applicable if using felt or mechanically fastened, polymer-modified bitumen sheet underlayment; synthetic-underlayment manufacturers recommend using self-adhering, polymer-modified bitumen sheet for valley underlayment. Paragraph is based on IBC requirements in areas where there is a possibility of ice forming along eaves causing a backup of water and on NRCA recommendations and IRC requirements in all geographic areas. Verify requirements of authorities having jurisdiction.

- C. Valley Underlayment: Install one layer of 36-inch- (914-mm-) wide underlayment centered in valley, running full length of valley, and on top of underlayment on field of roof that is woven through valley. Install all layers of underlayment in and through valley tight with no bridging.
 1. Use same underlayment as installed on field of roof.
 2. Lap ends at least 12 inches (305 mm) in direction that sheds water, and seal with asphalt roofing cement.
 3. Fasten to roof deck with underlayment nails located as far from valley center as possible and only to extent necessary to hold underlayment in place until installation of valley flashing.

Subparagraph below is based on IBC and IRC requirements for roof slopes less than 7:12 in areas where there is a possibility of ice forming along eaves causing a backup of water. Verify requirements of authorities having jurisdiction.

4. Solidly cement valley underlayment to roof-field underlayment that is woven through valley using asphalt roofing cement.

3.5 INSTALLATION OF SHEET METAL FLASHINGS AND TRIM{SHEET METAL FLASHING AND TRIM}

- A. Install metal flashings and trim in accordance with manufacturer's written instructions and recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" unless more stringent requirements are specified in this Section or indicated on Drawings.
 1. Install with minimum 4-inch (102-mm) end laps.

3.6 INSTALLATION OF ACCESSORIES{ACCESSORIES}

- A. Install accessories in accordance with manufacturers' written instructions unless more stringent requirements are specified in this Section or indicated on Drawings.

Retain "Battens" Paragraph below if required. Revise paragraph if installation of wood battens is specified in Section 061000 "Rough Carpentry" or if installation of metal battens is specified in Section 054000 "Cold-Formed Metal Framing."

Requirements for battens vary with roof assembly construction, shingle size, and metal shingle manufacturer's recommendations. Insert subparagraphs for counter battens if required. Battens are normally installed horizontally, perpendicular to roof-deck slope and parallel to eaves. Counter battens are normally installed vertically, parallel to roof-deck slope and parallel to rakes.

- B. Battens: Install battens in accordance with metal shingle manufacturer's written instructions.
 - 1. Metal Battens: Install metal battens horizontally over installed underlayment with ends separated by 1/2 inch (13 mm), at spacing required by metal shingle manufacturer, and securely fasten to roof deck with sheet metal fasteners.{METAL BATTENS}
- C. Metal Protection: Where dissimilar metals contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying self-adhering, polymer-modified bitumen sheet to each contact surface, or by other means of permanent separation recommended in writing by manufacturer of metal shingles or of the metals in contact.

3.7 INSTALLATION OF METAL SHINGLES{METAL SHINGLES}

- A. Install metal shingles in accordance with manufacturer's written instructions true in line.
- B. Maintain uniform exposure and coursing of metal shingles throughout roof.
- C. Apply sealant between shingles, flashing, trim, and exposed fasteners to achieve a weathertight system.

Generally, retain first option in first paragraph below. Retain second option only if aligning vertical joints of tile-form shingle panels.

- D. Interlock and overlap shingles, and stagger end joints from shingle courses above and below.
- E. Metal Protection: Where dissimilar metals contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying self-adhering, polymer-modified bitumen sheet to each contact surface, or by other means of permanent separation recommended in writing by manufacturer of metal shingles or of the metals in contact.

Retain subparagraph below if required to prevent galvanic corrosion between graphite and aluminum or aluminum-zinc alloy coated steel. See "Metal Considerations" Article in the Evaluations.

- 1. Do not use graphite pencils to mark metal surfaces.

3.8 FIELD QUALITY CONTROL

- A. Site Tests:
 - 1. As required by Regulatory Requirements.
- B. Inspection:
 - 1. As required by Regulatory Requirements.
 - 2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
 - 3. No work shall be without the inspections required by regulatory requirements.

3.9 ADJUSTING

- A. Remove and replace damaged or deformed metal shingles. Replace shingles with damaged or deteriorated finishes and other components of the Work that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as metal shingles are installed unless otherwise indicated in manufacturer's written installation instructions.
- C. On completion of installation, touch up minor nicks and abrasions in finish, in accordance with manufacturer's written instructions.
- D. Remove excess sealants.

3.10 CLEANING

- A. Clean in accordance with Specification Section - TEMPORARY FACILITIES AND CONTROLS.
 - 1. Leave area level and free of any ruts or debris. Appearance of earth surface shall be equal to or better than adjacent undisturbed surfaces.
 - 2. Clean any soiled surfaces immediately.
 - 3. Clean any soiled surfaces at the end of each day, minimum.
 - 4. Finish shall be clean and ready for the application of any additional finishes.
 - 5. In accordance with manufacturer's instructions and recommendations.

3.11 DEMONSTRATION

- A. In accordance with Specification Section - PROJECT CLOSEOUT.
 - 1. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train Owner's maintenance personnel as specified below.
 - 2. Schedule training with the Owner's maintenance personnel with at least seven (7) days advance notice.
 - a. Train Owner's maintenance personnel on procedures and schedules related to start-up and shut-down, troubleshooting, servicing, and preventative maintenance.
 - b. Review data in "Operating and Maintenance Manuals". Refer to Specification Section - PROJECT CLOSEOUT.

3.12 PROTECTION

- A. Protection from weather:
 - 1. Protect newly installed work from freezing for twenty-four (24) hours after erection, installation or application.
- B. Protection from traffic:
 - 1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.
 - 2. Immediately after cleaning, neatly apply four (4) mil thick, minimum, polyethylene film over finished surfaces at traffic areas. Fasten film firmly to surface.

3.13 ROOFING INSTALLER'S WARRANTY

Retain this article if required. Revise to include another Roofing Installer's Warranty form or as advised by Owner's counsel. Coordinate with "Warranty" Article.

- A. WHEREAS <Insert name of Contractor of <Insert address of Contractor, herein called the "Roofing Installer," has performed roofing and associated work ("the work") on the following project:
 - 1. Owner: Insert name of Owner.
 - 2. Owner Address: Insert address.
 - 3. Building Name/Type: Insert information.
 - 4. Building Address: Insert address.
 - 5. Area of the Work: Insert information.
 - 6. Acceptance Date: Insert date.
 - 7. Warranty Period: Insert time.
 - 8. Expiration Date: Insert date.
 - B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant the work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
 - C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that, during Warranty Period, Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of the work as are necessary to correct faulty and defective work and as are necessary to maintain the work in a watertight condition.
 - D. This Warranty is made subject to the following terms and conditions:
 - 1. Specifically excluded from this Warranty are damages to the work and other parts of the building, and to building contents, caused by:
 - a. Lightning;
- Insert required wind speed in first subparagraph below.
- b. Peak gust wind speed exceeding 120 speed mph;
 - c. Fire;

- d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. Faulty construction of copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. Vapor condensation on bottom of roofing; and
 - g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When the work has been damaged by any of foregoing causes, Warranty is to be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
 3. Roofing Installer is responsible for damage to the work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of the work.
 4. During Warranty Period, if Owner allows alteration of the work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty becomes null and void on date of the alterations, but only to the extent the alterations affect the work covered by this Warranty. If Owner engages Roofing Installer to perform the alterations, Warranty does not become null and void unless Roofing Installer, before starting the alterations, notified Owner in writing, showing reasonable cause for claim, that the alterations would likely damage or deteriorate the work, thereby reasonably justifying a limitation or termination of this Warranty.
 5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a use or service more severe than originally specified, this Warranty becomes null and void on date of the change, but only to the extent the change affects the work covered by this Warranty.
 6. Owner promptly notifies Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and affords reasonable opportunity for Roofing Installer to inspect the work and to examine evidence of such leaks, defects, or deterioration.
 7. This Warranty is recognized to be the only warranty of Roofing Installer on the work and does not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty does not operate to relieve Roofing Installer of responsibility for performance of the work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this Insert day day of Insert month, Insert year.

1. Authorized Signature: Insert signature.
2. Name: Insert name.
3. Title: Insert title.

END OF SECTION

SECTION 076000– SHEET METAL

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install all Sheet Metal materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 04 22 00 CONCRETE MASONRY UNITS
 4. 05 12 00 STEEL AND FABRICATIONS
 5. 05 30 00 METAL DECK
 6. 06 10 00 ROUGH CARPENTRY
 7. 06 41 23 MODULAR CASEWORK
 8. 07 14 16 FLUID-APPLIED WATERPROOFING
 9. 07 21 00 INSULATION
 10. 07 72 00 ROOF ACCESSORIES
 11. 07 92 00 SEALANTS
 12. 09 22 00 METAL FRAMING
 13. 09 24 00 CEMENT PLASTER
 14. 09 91 00 PAINTING
 15. 10 05 00 MISCELLANEOUS SPECIALTIES
 16. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 17. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. Standards:
1. DOD Department of Defense
 2. LIA Lead Industries Association.
 3. NRCA National Roofing Contractors Association
 4. SMACNA Sheet Metal and Air Conditioning Contractor's National Association, 6th Edition, Architectural Sheet Metal Manual.
 5. SSPC The Society of Protective Coatings

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Shop Drawings.

- a. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work.
2. Closeout Submittals in accordance with Specification Sections in Division One:
 - a. Warranty in accordance with Specification Section - WARRANTIES.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 1. Material Qualifications:
 - a. Work shall be in accordance with Standards and details set forth in latest edition of the SMACNA Manual and Specifications unless indicated otherwise.
 - b. The roofing manufacturer and installer selected for this project will select the roof flashing material and detailing for all roof penetrations compatible with the roofing system used and the warranties required. The schedule for roofing penetrations at the end of this section and the details contained within the drawings are minimum standards required for this project.
 2. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
- B. Regulatory Requirements:
 1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

1.5 PROJECT CONDITIONS

- A. Existing Conditions:
 1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
 2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.6 WARRANTY

- A. Contractor's General Warranty:
 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 1. In accordance with Specification Section - WARRANTIES.
 - a. Warranty Period Five (5) Years.

- C. Installer's Warranty:
1. Workmanship and Materials Warranty:
 - a. Warranty Period Five (5) years.
 - b. Upon project completion and acceptance, the subcontractor shall issue Owner a warranty against defective workmanship and materials.
 - c. The subcontractor shall warranty to maintain the roof flashing in a watertight condition for the period of years specified from the date of acceptance and shall be responsible for the repair of any failure that is the result of defects in materials and workmanship.
 - d. The subcontractor shall obtain from the Roofing Installer and the General Contractor a co-endorsement of the Warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified product manufacturer:
 - a. Ice and Water Shield:
 - 1) GRACE CONSTRUCTION PRODUCTS
 - a) ICE and WATER SHIELD HT.
 - 2) Acceptable alternative manufacturers:
 - a) CARLISLE COATINGS & WATERPROOFING - CCW WIP 400.
 - b. Penetration Flashing:
 - 1) GRACE CONSTRUCTION PRODUCTS "VYCOR V40."
 - 2) Acceptable Alternative Manufacturer:
 - a) FORT-I-FIBER "Fort-I-Flash 40."
 - b) TYVEK "FlexWrap" and "Straight Flash."
 - c. Reglets:
 - 1) FRY REGLET CORPORATION.
 - d. Primer Paint:
 - 1) DEVOE COATINGS PAINT.
 - e. Galvanized Repair Paint:
 - 1) RECTORSEAL.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Sheet Metals:

1. Steel Sheet:
 - a. Zinc-Coated, Commercial quality with 0.20 percent copper, ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process," G-90 hot-dip galvanized, mill phosphatized where indicated for painting; 0.0359 inch thick (20 gage) minimum, except as otherwise indicated.
2. Lead Sheet:
 - a. ASTM B 749 "Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products," Type L51121, copper-bearing sheet lead, minimum 4 lb/sq. ft. (0.0625 inch thick) minimum for burning (welding) unless otherwise indicated.
3. Aluminum Sheet:
 - a. Provide sheet aluminum in accordance with ASTM B 209 "Specification for Aluminum and Aluminum-Alloy Sheet and Plate," alloy 3003, temper H14, AA-C22A41 clear anodized finish.
 - 1) Gage: 0.063 inches.
 - 2) Prepare anodized finish for application of primer and finish coats as indicated on the drawings.
4. Stainless-Steel Sheet:
 - a. ASTM A 167 "Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip," Type 304, soft annealed, with No. 4 finish, except where harder temper is required for forming or performance; minimum 0.0625 inch thick (16 gage), unless otherwise indicated.

2.3 MANUFACTURED UNITS

A. Reglets:

1. General: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces and compatible with flashing indicated.
2. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
3. Plaster Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
4. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
5. Flexible Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
6. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of the counterflashing lower edge.
 - a. Material: Galvanized steel, thickness matching material being installed, unless otherwise noted.

2.4 ACCESSORIES

A. Solder:

1. Solder for galvanized steel:
 - a. ASTM B 32 "Specification for Solder Metal," Grade Sn50, used with rosin flux.
2. Solder for stainless steel:

- a. ASTM B 32 "Specification for Solder Metal," Grade Sn60, used with an acid flux of type recommended by stainless-steel sheet manufacturer; use a noncorrosive rosin flux over tinned surfaces.
- B. Stainless Steel Welding Rods:
1. Type recommended in writing by stainless-steel sheet manufacturer for type of metal sheets furnished
- C. Fasteners:
1. Same material as sheet metal or other non-corrosive metal as recommended by sheet metal manufacturer, unless otherwise indicated on the drawings.
 - a. Match finish of exposed heads with material being fastened.
- D. Electrolytic Insulation:
1. Asphalt Mastic:
 - a. SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil (0.4-mm) dry film thickness per coat.
 2. Other electrolytic insulation materials:
 - a. Asphalt impregnated felt, neoprene or EPDM rubber.
- E. Sealants shall be in accordance with Specification Section - SEALANTS.
1. Mastic Sealant:
 - a. Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
 2. Elastomeric Sealant:
 - a. Generic type recommended by sheet metal manufacturer and fabricator of components being sealed.
 3. Epoxy seam sealer:
 - a. 2-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior and interior nonmoving joints, including riveted joints.
- F. Adhesives:
1. Type recommended by sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of sheet metal.
- G. Metal Accessories:
1. Provide sheet metal clips, straps, anchoring devices, screens, mesh, and similar accessory units as required for installation of work, matching or compatible with material being installed; noncorrosive; size and thickness matching material being installed.
- H. Roofing Cement:
1. ASTM D 4586 "Specification for Asphalt Roofing Cement, Asbestos Free," Type I.
 - a. Verify with roofing material utilized for this project as being compatible with materials and roofing manufacturer's warranty requirements.
- I. Gutter Sealing System (when applicable):
1. Primer:
 - a. Suitable for metal gutter metal type and compatible with Coatings and Fabrics.
 2. Base, Intermediate and Finish Layer Coating:
 3. Base Layer Fabric:

- a. Polyester Fabric compatible with primer and coatings.
- J. Penetration Flashing:
- 1. Self-Adhered and self-healing weather barrier strips, in accordance with FS UU-B-790a, Grade A.
 - a. 40 mil. minimum thickness, in 9 inch and 12 inch widths as is appropriate for the barrier application.

2.5 FABRICATION

- A. Sheet Metal Fabrication Standard: Fabricate sheet metal to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.
- 1. Comply with details shown to fabricate sheet metal that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 2. Form exposed sheet metal work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.
 - 3. Seams:
 - a. Fabricate nonmoving seams in sheet metal with "Drive Cleat" or "Lock" seams.
 - 4. Expansion Provisions:
 - a. Space movement joints at maximum of 10 feet (3 m) with no joints allowed within 24 inches of corner or intersection.
 - b. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
 - c. Gutter Expansion control and design, unless otherwise indicated on the drawings:
 - 1) Ends of a gutter shall occur no more than forty (40) feet apart with at least one downspout in between, and gapped in accordance with Chapter 1, Table 1-7.
 - 2) Adjacent ends shall be telescoped or enclosed with covers in a manner to accommodate expansion as indicated in Chapter 1, Fig. 1-5 to 1-7 and 1-10.
 - 5. Sealed Joints:
 - a. Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 - 6. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.
 - 7. Conceal fasteners and expansion provisions where possible.
 - a. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.
 - 8. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
 - a. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

2.6 FINISHES

A. Shop Finishing:

1. All exterior galvanized sheet metal, unless specified otherwise, shall have all surfaces, except surfaces receiving roofing felt, properly cleaned and prepared and then painted with one coat Galvanized Metal Primer prior to installation.
 - a. Galvanized Metal Primer: 4020PF "DEVGUARD," or approved equivalent.
 - b. Galvanized repair paint: High-Zinc-Dust-Content, in accordance with SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight paint for re-galvanizing welds and repair painting galvanized steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:

1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:

1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:

1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
3. Prime substrates as required by manufacturer's written instructions and recommendations.

3.3 INSTALLATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.

2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.
5. Structurally reinforce and anchor work as required.
6. Work shall be weather and water tight as required.
7. Where dissimilar metals come into surface contact, cover surface in contact with electrolytic insulation.
8. Immediately following installation, and prior to roofing application, the metal will be primed with a quick drying primer compatible with roofing system installed and in compliance with roofing manufacturer's warranty requirements.

B. Layout:

1. Lines shall be straight and true.
2. Field mitered joints shall be neat, true to line, and water tight.
3. Fastening:
 - a. In accordance with approved shop drawings.
4. Sealants:
 - a. Seal all joints with sealant.

C. Assistance:

1. Installation shall be in direct consultation and review of roofing system manufacturer where applicable.

D. Penetration Flashing:

1. Apply Penetration Flashing in conjunction with Water Barriers, Metal Accessories and all other related work.
2. Install Penetration Flashing at all openings and penetrations at all exterior walls and at interior walls considered to be "Semi-Wet" and "Wet" exposures (i.e., Toilets, Showers, Lockers, Kitchens, etc.).
3. Install Penetration Flashings with Water Barriers, Metal Accessories and all other related work in "shingle" or "weatherboard" fashion.
4. Penetration Flashings shall be installed as required in CBC Sections 1404 in 9" widths and continuous to 9" past all intersections around all openings, penetrations and termination of Sheet Metal Systems.
 - a. Should any penetration warrant a greater width of wall flashing, provide 12" wide flashing as required.
 - b. When an object extends through the Sheet Metal System, return the edge of the Penetration Flashing 1" and apply to the sides of the penetrating item.
5. Objects such as electrical back-boxes, electrical speaker enclosures, penetrations created by structural members, and the like.

3.4 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.

1. Clean any soiled surfaces immediately.
2. Finish shall be clean and ready for the application of any additional finishes.

3.5 SCHEDULES

- A. The Schedules are divided into "Architectural" Sheet Metal Items and "Utility" Sheet Metal Items:
 - 1. Architectural Sheet Metal Items: Those items visible from the interior occupied spaces and from all exterior viewing positions. Fabrication of all Architectural Items shall provide a fully finished appearance on all visible surfaces. Fabrication shall be soldered or welded joints and ground smooth. Solid flat head riveted joints may be used if necessary, but limited in use and must be indicated on the shop drawings by the fabricator, and accepted by the Architect. The use of sheet metal screws, pop rivets, or bolts are not permitted. All joints between section shall be uniformly gapped with a maximum of 1/16" and splice backing shall be centered on the joint.
 - 2. Utility Sheet Metal Items: Those items not visible from the interior occupied spaces nor from exterior viewing positions. Fabrication of all Utility Items shall be in accordance with SMACNA Standards and shop practices.
- B. Sheet Metal Schedules should be used as a guide only and it is not considered as a complete list. Refer to Drawings for locations of all conditions requiring sheet metal items.
- C. Multiple types of material are specified for various items in the Schedules. Verify with roofing manufacturer as to which material shall be used to be compatible to the roofing material provided and to satisfy roofing warranty requirements.
- D. Materials gages specified for Items in the Schedules are minimum and shall be provided unless otherwise noted on the Drawings.
- E. Schedule's Remarks / SMACNA No., 6th Edition, and are references of the standards for fabrication. Refer to Drawings for configurations and other fabrication requirements of sheet metal items.
- F. Architectural Sheet Metal Items

"ARCHITECTURAL" SHEET METAL ITEMS					
ITEM	LOCATIO N	MAT.	GA.	FINISH	REMARKS / SMACNA NO., 6th Edition
Parapet Cap	Parapet Walls	Steel	20	Shop	Chapter 3, similar to Fig. 3-4A or Fig. 3-4G with E-1 and E-4 edge styles, as indicated on drawings. Provide J9 "Drive Cleat" joints, typical.
Cap Coping	Parapet Walls	Steel	20	Shop	Chapter 3, similar to Fig. 3-4G with E-4 edge style, as indicated on drawings. Provide J9 "Drive Cleat• " joints, typical.
Drip Flashing	Various Conditions	Steel	22	Shop	Chapter 4, minimum 4" under finish and minimum 4" cover. Provide J2 "Butt & Backup Plate" • joints with 1/16" gap. Fabricate Transition pieces and End Caps.
Counter Flashing	Various Conditions	Steel	22	Shop	Chapter 4, minimum 4" under finish and minimum 4" cover with 3/4" hemmed drip. Provide J2 "Butt & Backup

"ARCHITECTURAL" SHEET METAL ITEMS					
ITEM	LOCATIO N	MAT.	GA.	FINISH	REMARKS / SMACNA NO., 6th Edition
					Plate• " joints with 1/16" gap. Fabricate Transition pieces and End Caps.
Opening Heads, Jambs & Sill Flashing	Metal Frames	Steel	22	Shop	Weld and Grind smooth all joints
Opening Heads, Jambs & Sill Flashing	Aluminum Windows	Alum	0.0253	Match Aluminum Window Finish.	Seal all joints.
Opening Heads, Jambs & Sill Flashing	Storefront	Alum	0.0253	Match Storefront Finish.	Seal all joints.
Opening Heads, Jambs & Sill Flashing	Curtain Wall	Alum	0.0253	Match Curtain Wall Finish.	Seal all joints.
Wall Penetration Flashing	Exterior Wall	Steel	22	Shop	Similar to Chapter 6, Figures 6-36, 37, 38 & 39.
Scuppers	Parapet Wall	Steel	22	Shop	Chapter 1, similar to Fig. 1-26A-B or 1-30A-B.
Gutters	Exterior	Steel	18	Shop	Chapter 1, Fig. 1-1. Provide expansion joints similar to Fig. 1-7. Solder overflow and downspout outlets.
Conductor Head	Exterior	Steel	18	Shop	Chapter 1, similar to Fig. 1-25. Solder downspout outlet.
Down Spouts	Exterior	Steel	18	Shop	Chapter 1, similar to Fig. 1-31, 1-32A or B. Provide Fig. 1-35B or J hangers.
Fascia Panels	Exterior	Steel	18	Shop	Weld and grind smooth all joints.
Color Band Panels	Exterior	Steel	18	Shop	Weld and grind smooth all joints.
Serving Counter	Serving Counter	S.S.	16	#4	Weld and Grind smooth all joints
Work Counter	Work Counter	Steel	16	Shop	Weld and Grind smooth all joints
Fabricated Tilt Mirror	Student Restrooms	S.S.	16	#4	Weld and grind smooth all joints.

G. Utility Sheet Metal Items

"UTILITY" SHEET METAL ITEMS					
ITEM	LOCATIO N	MAT.	GA.	FINISH	REMARKS / SMACNA NO., 6th Edition
Clips & Cleats	Various Conditions	Steel	22	Shop	
Parapet Boot Flashing	Parapet Cap & Cap Coping	Steel	18	Shop	Solder all joints. Minimum 4" under finish and min. 4" cover.
Counter Flashing	Various Conditions	Steel	22	Shop	Minimum 4" under finish and min. 4" cover with ¾" hemmed drip. Provide J2 "Butt & Backup Plate" joints with 1/16" gap. Fabricate Transition pieces and End Caps.
Reglet & Counter Flashing	Plaster Parapets	Steel	24	Shop	FRY Spring Lock Type "ST" with "Spring-Loc" Flashing. Preformed transition pieces and end caps.
Reglet & Counter Flashing	Plaster Parapets	Steel	24	Shop	FRY Spring Lock Type "STX" with "Spring-Loc" Flashing. Preformed transition pieces and end caps.
Reglet & Counter Flashing	Masonry Parapet	Steel	24	Shop	FRY Spring Lock Type "MA" with "Spring-Loc" Flashing. Preformed transition pieces and end caps.
Reglet & Counter Flashing	Masonry Parapet	Steel	24	Shop	FRY Spring Lock Type "SM" with "Spring-Loc" Flashing. Preformed transition pieces and end caps.
Structural Support Flashing	Roof Penetration	Steel	18	Shop	Chapter 4, Similar to Figures 16A or B or C if welded or soldered, and grind smooth.
Vent Pipe Flashing	Roof Penetration	Lead or Steel	4#/sf or 22	Shop	Chapter 4, Fig. 4-15B.
Pipe or Conduit Flashing	Roof Penetration	Lead or Steel	4#/sf or 22	Shop	Chapter 4, similar to Figure 4-15C.
Multiple Pipe or Conduit Flashing	Roof Penetration	Lead or Steel	4#/sf or 22	Shop Or Shop	Chapter 4, similar to Figure 4-15A or 4-15B.
Insulated Pipe Flashing	Roof Penetration	Lead or Steel	4#/sf or 22	Shop	Chapter 4, Similar to Fig. 4-15C. Refer to Plumbing.
Mechanical Flue Pipe Flashing	Roof Penetration	Lead or Steel	4#/sf or 22	Shop	Chapter 4, Similar to Fig. 4-15C. Refer to Plumbing.
Manufactured Curb Flashing	Roof Penetration	Steel.	22	Shop	Provide formed metal corners lapped 6" with sheet metal screws with neoprene washers at 18" o.c.
Hatch	Roof	Steel.	22	Shop	Provide formed metal corners lapped 6"

"UTILITY" SHEET METAL ITEMS					
ITEM	LOCATIO N	MAT.	GA.	FINISH	REMARKS / SMACNA NO., 6th Edition
Flashing	Penetratio n				with sheet metal screws with neoprene washers at 18" o.c.
Ventilating Units Flashing	Roof Penetratio n	Steel.	22	Shop	Provide formed metal corners lapped 6" with sheet metal screws with neoprene washers at 18" o.c.
Scuppers	Parapet Screens	Steel.	22	Shop	Chapter 1, similar to Fig. 1-26A-B or 1-30A-B.
Roof Splash Pans	Roof	Steel.	22	Shop	Chapter 1, Fig. 1-36, 2-rib corrugation section..
Valley Flashing	Metal Panel Roof	Steel.	22	Shop	Chapter 6, Similar to Fig. 6-6 or Fig. 1-21 or Fig. 1-23, Detail 10, or Fig. 6-9, Detail 7 and Chapter 4, Fig. 4-10.
Built-in Gutter	Metal Panel Roof	S.S.	16	Shop	Chapter 1, similar to Fig. 1-4 or Fig. 1-21 or Fig. 1-23. Provide expansion joint similar to Fig. 1-8. Weld and grind smooth all joints.
Louver Screens	Louvered Openings	Steel.	14	Shop	Chapter 7, Fig. 7-7A or B. Provide 12 gage (0.105) 3 x 3 welded wire mesh.
Plumbing Sheet Metal	Various Plumbing Conditions	Steel.	22	Shop	Refer to Plumbing Drawings and Specifications.
Mechanical Sheet Metal	Various Mechanical Conditions	Steel.	22	Shop	Refer to Mechanical Drawings and Specifications.
Electrical Sheet Metal	Various Electrical Conditions	Steel.	22	Shop	Refer to Electrical Drawings and Specifications.
Roof and Overflow Drain Pans	Roof	Lead	#4	Shop	See Details.
Mechanical , Large Flue Flashing	Roof Penetratio n	Steel	22	Shop	Chapter 4, Detail 4-14A.

END OF SECTION

SECTION 077200 – ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install all roof accessory materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 05 12 00 STEEL AND FABRICATIONS
 4. 05 30 00 METAL DECK
 5. 06 10 00 ROUGH CARPENTRY
 6. 07 60 00 SHEET METAL
 7. 07 92 00 SEALANTS
 8. 09 22 16 METAL FRAMING
 9. 09 91 00 PAINTING
 10. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

- A. Standards:
1. In accordance with the following standards:
 - a. ASTM American Society for Testing and Materials
 - b. LIA Lead Industries Association.
 - c. NRCA National Roofing Contractors Association (If the roofing system scheduled to be installed calls for related sheet metal flashing to be in accordance with NRCA detailing in order to satisfy their warranty requirements, then the NRCA detailing shall govern in lieu of SMACNA standards.)
 - d. OSHA Occupational Safety and Health Administration
 - e. SMACNA Sheet Metal and Air Conditioning Contractor's National Association, latest Edition, Architectural Sheet Metal Manual.

1.3 SYSTEM DESCRIPTION

- A. (Manufactured Curbs Only) This section specifies curbs for mechanical and electrical equipment specified in Division 23 and Division 26, as well as architectural curbs in Division 05, Division 07 and Division 08. These curbs are designed and fabricated as welded single piece units that are structurally designed by the manufacturer to span structural framing. The curbs require structural calculations from the manufacturer in accordance with the CBC for the mechanical or electrical units supplied that are mounted on top of the curbs.

1. Manufactured curbs shall be designed, engineered, and fabricated for exact mechanical units selected after bid, and can be designed for compound slopes and difficult roofing conditions. Designs shall accommodate each type of roofing condition.
2. All curbs shall be designed to be a minimum of 8-inches above the finished roof at the top most portion of the curb, and designed with crickets for watertight connections.
3. Construct curbs to match roof slopes with plumb and level top surfaces for mounting mechanical or electrical equipment.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

1. Coordination Drawings (Manufactured Curbs only):
 - a. Manufacturer(s) shall coordinate with the Contractor and the Roofing Subcontractor all applicable work placed on or penetrating the roof deck and roof membrane system for the proper selection of Roof Accessories for this project. Manufacturer shall coordinate with the Contractor all weights and dimensions from approved shop drawings of mechanical equipment and piping/conduit required for this project and fabricate accordingly. All items coordinated (including Structural Calculations) shall be presented within the shop drawings for the Architect's and Structural Engineer of Record's review.
2. Product Data.
 - a. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
 - b. Submit manufacturer's standard color range for selection by the Architect.
3. Shop Drawings.
 - a. Submit shop drawings prepared by, or under the supervision of a registered Civil or Structural Engineer in the State of California, detailing fabrication and assembly of the work under this section, as well as procedures and diagrams. Include setting drawings, templates, and directions for installation of anchor bolts and other anchorage to be installed as unit of work of other related sections.
 - 1) Manufactured Curbs must be coordinated with the Structural Shop Drawings and Mechanical / Electrical Equipment supplied as to size and weights for any roof top installation.
4. Quality Assurance/Control Submittals:
 - a. Manufacturer's Written Instructions:
 - 1) Manufacturer's written instructions.
5. Closeout Submittals in accordance with the following:
 - a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - c. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
 - d. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications:

- a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
2. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:

1. Products shall be individually wrapped.
2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:

1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and protection:

1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

1. Hatch Railing System shall provide a warranty against defects in material and workmanship:
 - a. Warranty Period Twenty-Five (25) Years.
 - 1) From the Date of Substantial Completion.

C. Installer's Warranty:

1. Weather Tightness Warranty for Roof Accessories: Manufacturer's Standard form in which manufacturer agrees to repair or replace Roof Accessory assemblies that fail to remain weathertight, including leaks within specified warranty period. Warranty shall guarantee manufactured Roof Accessories to be free from defects in materials or workmanship.

- a. Warranty Period Five (5) Years.
 - 1) From the Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified Manufactured Curb product manufacturer, or approved equivalent:
 - a. ROOF PRODUCTS, INC.
 - 1) RP Series to match specified products.
 - b. Acceptable alternative manufacturers:
 - 1) ROOF PRODUCTS & SYSTEMS CORP.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MANUFACTURED UNITS

- A. Manufactured Curbs:
 - 1. General:
 - a. Curbs shall be constructed to match roof slope of roof and provide a level top surface for mounting of mechanical equipment.
 - 1) Minimum height of all curbs shall be 8 inches above finished roof per NRCA requirements.
 - b. Provide ROOF PRODUCTS, INC., Model Numbers as follows:
 - 1) RPC Series for Built-up Roofs.
 - 2) RPMB Series for Metal Roofs.
 - 3) RPES Series for Equipment Supports.
 - c. Finish:
 - 1) Powder Coated finish to match the color of the Metal Shingle Roof System.
 - 2. Equipment Curbs: Provide ROOF PRODUCTS, INC., Model Numbers as follows:
 - a. RPC-5 for Built-up roofs.
 - b. RPMB-5 for Metal Roofs.
 - c. Factory installed pressure treated wood nailers.
 - d. Welded 18 gage minimum galvanized steel shell and base plate, as applicable to roof equipment situation, with continuous mitered and welded corner seams.
 - e. 3 lb. density rigid fiberglass insulation board.
 - f. Internal angle reinforcing (1" x 1" x 12 gage) on sides greater than 36 inches in length, spaced 24 inches o.c.
 - g. All welds to be coated with manufacturer's "Alumanation 100."

- h. Internal curb duct supports as required for the type of Mechanical units selected for the project.
- 3. Equipment Platform: Provide ROOF PRODUCTS, INC., Model Numbers as follows:
 - a. RPPF-5 for Built-up Roofs.
 - b. RPMB-5 for Metal Roofs.
 - c. Factory installed pressure treated wood nailers.
 - d. Welded 18 gage minimum galvanized steel shell and base plate, as applicable to roof equipment situation, with continuous mitered and welded corner seams.
 - e. 3 lb. density rigid fiberglass insulation board.
 - f. Internal angle reinforcing (1" x 1" x 12 gage) on sides greater than 36 inches in length, spaced 24 inches o.c.
 - g. All welds to be coated with manufacturer's "Alumanation 100."
 - h. Internal curb duct supports as required for the type of Mechanical units selected for the project.
 - i. Platform Cover:
 - 1) Welded 18 gage galvanized steel construction.
 - 2) Cover cross broken for positive water run-off.
 - 3) Flared drip edge.
 - 4) Flat Lock and Soldered seams on covers 43 inches x 105 inches and larger.
 - j. Platform: Provide 1-1/8" thick fire-retardant treated T & G plywood top sheathing
 - k. Vapor Retarder: Two layers of 15lb building paper between plywood platform and curb cover.
- 4. Equipment Supports: Provide ROOF PRODUCTS, INC., Model Numbers as follows:
 - a. RPES-3 for Built-up Roofs.
 - b. 18 gage minimum galvanized steel shell, base plate and counterflashing.
 - c. Factory installed pressure treated wood nailer.
 - d. Internal bulkhead re-enforcement.
 - e. All welded construction.
 - f. Vapor Retarder: Two layers of 15lb building paper between wood nailer and counterflashing.
- 5. Accessories:
 - a. Square to Round adapter as indicated on the drawings:
 - 1) Cross broken for positive run-off.
 - 2) Type WG 16 gage galvanized steel construction.
 - 3) Watertight construction.
 - 4) Insulated to prevent condensation.
 - b. "Dectite" size and number applicable to the size of pipes penetrating the roof deck indicated in the Contract Documents.
 - c. Fasteners as required by the manufacturer for the proper installation of the roof curbs and weather resistant coating as standard with the manufacturer.
 - d. Neoprene strips, sheets or washers as required by the manufacturer for weathertight construction.
 - e. Provide Isolation Rails as required by Mechanical in DIV. 23 or Electrical in DIV. 26.
- 6. Finish:
 - a. Powder Coated finish to match the color of the Metal Shingle Roof System.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
 - 1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
 - 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 - 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Coordination:
 - 1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
- B. Protection:
 - 1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
- C. Surface Preparation:
 - 1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
 - 2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

- A. General:
 - 1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
 - a. Provide Hatch Railing System on all hatches or fire vents within ten (10) feet of any roof edge) and install in accordance with manufacturer's written instructions.
 - 2. In accordance with approved submittals.
 - 3. In accordance with Regulatory Requirements.
 - 4. Set plumb, level, and square.
 - 5. Damaged products shall not be installed.
- B. Layout:
 - 1. Lines shall be straight and true.

3.4 FIELD QUALITY CONTROL

- A. Site Tests:

1. As required by Regulatory Requirements.

B. Inspection:

1. As required by Regulatory Requirements.
2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.

3.5 ADJUSTING

- A. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.

3.6 CLEANING

- A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces immediately.
 2. Finish shall be clean and ready for the application of any additional finishes.
 3. In accordance with manufacturer's written instructions and recommendations.

END OF SECTION

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SECTION 079200 – SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all joint sealant materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 5. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SYSTEM DESCRIPTION

- A. Performance Requirements: It is the intention of this specification section and the drawings to form a guide for a complete and operable system. Any items not specifically noted but necessary for a complete and operable system shall be provided under this section.
 - 1. Provide elastomeric sealants for exterior applications that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.
 - 2. Provide sealants for interior applications that have been produced and installed to establish and maintain airtight continuous seals that are water-resistant and cause no staining or deterioration of joint substrates.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 - 1. Product data from manufacturers for each joint sealant product required.
 - 2. Shop drawings:
 - a. Provide full details of all sealants and accessories proposed for use for approval by the Architect. All materials and products proposed shall be compatible with each other and with the substrates and adjacent wall colors, and shall be non-staining and non-bleeding. Submit an affidavit from the manufacturer confirming the acceptance of the use of the selected products in the manner and on the substrates proposed.
 - 3. Samples.

- a. Samples for initial selection purposes in form of manufacturer's bead samples, consisting of strips of actual products showing full range of colors (standard, premium and custom) available, for each product exposed to view.
 - 1) Provide color chips of adjacent wall surface colors; to be used in evaluating the sealant color samples.
- 4. Quality Assurance/Control Submittals:
 - a. Provide UL Assembly Classification appropriate for each fire rated penetration.
 - b. Certificates:
 - 1) Submit three (3) copies of certificates.
 - a) Certification by each joint sealant manufacturer that sealants plus the primers and cleaners required for sealant installation comply with local regulations controlling use of volatile organic compounds.
 - b) Certified test reports for elastomeric sealants on aged performance as specified, including hardness stain resistance, adhesion, cohesion or tensile strength, elongation, low temperature flexibility, compression set, modulus of elasticity, water absorption, and resistance (aging, weight loss, deterioration) and heat and exposure to ozone and ultra violet light. Adhesion data shall include long-term adhesion characteristics of all adhesion surfaces including silicone, aluminum and glass coatings and long term weathering test on the silicone on contact with similar materials.
 - c) Certificate of Installation: Signed by the installer and sealant manufacturer stating that sealant installed complies with specifications, and that installation methods comply with manufacturer's printed instructions for each condition of installation and use on the project. The sealant installer shall have no less than five years of continuous experience in installing the specified products. Their experience shall include similar work to this subject project. In addition, the manufacturers will provide written approval of the material installers.
 - c. Manufacturer's Written Instructions:
 - 1) Submit three (3) copies of manufacturer's written instruction
 - d. Closeout Submittals in accordance with Specification Sections in Division One:
 - e. Warranty in accordance with Specification Section - WARRANTIES.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Material Qualifications:
 - a. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.
 - 2. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - 3. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units and colors without causing delay in the work.
- B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. AAMA American Architectural Manufacturer's Association
 - 1) AAMA 800-92 - "VOLUNTARY SPECIFICATIONS AND TEST METHODS FOR SEALANTS.
 - b. ASTM American Society for Testing and Materials.
 - 1) ASTM C 1193 - "STANDARD GUIDE FOR USE OF JOINT SEALANTS."
 - c. CA-CHPS California High Performance Schools
 - d. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - e. GANA Glass Association of North America, 1997 Edition of the Glazing Manual, and the most recent Edition of the Sealant Manual.
 - f. SWRI Sealant Waterproofing Restoration Institute - Types of standards as found in Chapter III "Sealants: The Professionals' Guide."

C. Meetings:

1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with all other related work.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.
 1. Comply with the Sealant Requirements of the GANA Glazing Manual and GANA Sealant Manual.
- B. Store and handle materials in compliance with manufacturer's written recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.
 1. Store sealant containers in a protected location in accordance with their manufacturer's printed instructions until their use.

1.6 PROJECT CONDITIONS

- A. Environmental requirements:

1. Apply materials within manufacturer's written recommended surface and ambient temperature ranges.
2. Apply materials when working joints are most likely to be normal size.
3. Do not install sealants under adverse weather conditions, or when temperatures are beyond manufacturer's written recommended limits.
 - a. Proceed with the installation only when forecasted weather conditions are favorable for proper sealant cure, and development of early bond strength. Allow a minimum of three days after rain.
 - b. Where joint width is affected by ambient temperature variations, install sealants only when temperatures are in the lower third of manufacturer's written recommended installation temperature range, so that sealant will not be subjected to excessive elongation and bond stress at low temperatures.

1.7 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

1. In accordance with Specification Section - WARRANTIES.
2. Manufacturer shall warrant exterior joint sealant after substantial completion of work.
 - a. Warranty Period Ten (10) Years.

C. Installer's Warranty:

1. Sealant Contractor shall warrant sealants against defective materials and workmanship after substantial completion of work.
 - a. Warranty Period Five (5) Years.
 - b. Warranty shall further state that installed sealants are warranted against the following:
 - 1) Water leakage through sealed joints.
 - 2) Adhesive or cohesive failure of sealant.
 - 3) Staining of adjacent surfaces caused by migration of primer or sealant.
 - 4) Chalking or visible color change of the cured materials.
 - c. The installer shall make repairs during the warranty period at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.

1. Specified product manufacturer, or approved equivalent:
 - a. One-Part Neutral Cure Silicone Sealant:
 - 1) PECORA "#890"

- a) NOTE: For continual immersion in water conditions, provide PECORA "Dynatred".
- b) If the water contains a chlorine content of 5ppm, then PECORA "Synthacalk GC2+" shall be used.
- 2) Acceptable alternative manufacturers for 1) only above:
 - a) BONDAFLEX "Sil 290"
 - b) DOW PERFORMANCE SILICONES "#790"
 - c) SONNEBORN "Sonolastic 150" or "Sonolastic 150 VLM"
- b. One-Part Acid-Curing Silicone Sealant:
 - 1) PECORA "#860"
 - 2) Acceptable alternative manufacturers:
 - a) BONDAFLEX "Sil 100 GP"
 - b) DOW PERFORMANCE SILICONES "#999-A"
 - c) SONNEBORN "Omniplus"
- c. One-Part Mildew-Resistant Silicone Sealant:
 - 1) PECORA:
 - a) White Color Only "#345"
 - b) Available in multiple colors for selection "#898"
 - 2) Acceptable alternative manufacturers to 1), a), above:
 - a) BONDAFLEX "Sil 100 WF"
 - b) DOW PERFORMANCE SILICONES "#786"
 - c) SONNEBORN "Omniplus"
- d. One-Part Gun Grade Urethane Sealant:
 - 1) PECORA "Dynatrol I-XL"
 - 2) Acceptable alternative manufacturers:
 - a) BONDAFLEX "Pur 25" or "Pur 25 Tex"
 - b) SIKA "Sikaflex 1a" or "Sika Textured"
 - c) SONNEBORN "NP1 Smooth" or "X1 Textured"
 - d) VULKEM "#116"
- e. Multi-Component Gun Grade Urethane Sealant:
 - 1) PECORA "Dynatred"
 - 2) Acceptable alternative manufacturers:
 - a) BONDAFLEX "Pur 2 NS"
 - b) SIKA "Sikaflex 2c NS"
 - c) SONNEBORN "NP2"
- f. Multi-Component Gun Grade Urethane Sealant (Fast Curing):
 - 1) PECORA "Dynatred"
 - 2) Acceptable alternative manufacturers:
 - a) BONDAFLEX "Pur 2 NS"
 - b) SIKA "Sikaflex 2c NS"
 - c) SONNEBORN "NP2" with manufacturer's accelerator.
 - d) VULKEM "#227"
- g. One-Part or Multi-Component Gun Grade Urethane Sealant (Security Sealant) :
 - 1) PECORA "Dynaflex"
 - 2) Acceptable alternative manufacturers:
 - a) BONDAFLEX "Pur 2 NS"
 - b) SIKA "Sikaflex 2c NS TG"
 - c) SONNEBORN "Ultra"
- h. One-Part Pourable Self-Leveling Urethane Sealant:
 - 1) PECORA "Urexpan NR-201" or "Dynatred"
 - 2) Acceptable alternative manufacturers:

- a) BONDAFLEX "Pur 35 SL"
- b) SIKA "Sikaflex 1c SL"
- c) SONNEBORN "Sonolastic SL 1"
- d) VULKEM "#45"
- i. Multi-Component Pourable Self-Leveling Urethane Sealant (Fast Curing):
 - 1) PECORA "Urexpan NR-200"
 - 2) Acceptable alternative manufacturers:
 - a) BONDAFLEX "Pur 2 SL"
 - b) SIKA "Sikaflex 2c SL"
 - c) SONNEBORN "Sonolastic SL 2"
 - d) VULKEM "#245/255"
- j. Acrylic-Emulsion Sealant:
 - 1) PECORA "AC-20"
 - 2) Acceptable alternative manufacturers:
 - a) BONDAFLEX "Sil-A 700"
 - b) SONNEBORN "Sonolac"
- k. One-Part Butyl Sealant:
 - 1) PECORA "BC-158"
 - 2) Acceptable alternative manufacturers:
 - a) PTI (by H.B. FULLER) "#707"
- l. Acoustical Sealant:
 - 1) PECORA:
 - a) Exposed areas; Pecora "AC-20 FTR"
 - b) Concealed areas: Pecora "AIS-919"
 - 2) Acceptable alternative manufacturers:
 - a) BONDAFLEX "Sil-A 700"
 - b) OSI "GRABBER" #GSCS
 - c) TREMCO INC. 834
 - d) W.W. HENRY "#413"
- m. Glazing Tape Sealants:
 - 1) Butyl Glazing Tape:
 - a) PECORA "Extru-Seal"
 - b) Acceptable alternative manufacturers:
 - c) TREMCO, INC. "440 Tape"
 - 2) Butyl Pressure Glazing Tape:
 - a) PECORA "Dyna-Seal"
- n. Pre-Compressed Foam Sealants:
 - 1) EMSEAL CORP. "Emseal"
- o. Sheet Caulking (Electrical Junction Box Sealers):
 - 1) LOWRY "Electrical Box Sealer"
 - 2) Acceptable alternative manufacturer:
 - a) TREMCO INC. "Sheet Caulking"
- p. EIFS preformed paintable Urethane Tape:
 - 1) SIKA "Sikaflex PUR" Tape System

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. General:

1. Compatibility: Provide sealants, 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.

a. Colors: Provide color of exposed sealants to comply with the following:

- 1) Sealant colors shall match adjacent wall color.
- 2) Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

B. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing elastomeric sealants (Silicones, Urethanes, and Acrylics) that comply with ASTM C 920 "Specification for Elastomeric Joint Sealants," and other requirements indicated on each Elastomeric Joint Sealant listed, including those requirements referencing ASTM C 920 "Specification for Elastomeric Joint Sealants," classifications for Type, Grade, Class, and Uses.

1. Additional Movement Capability: Where additional movement capability is specified in Elastomeric Joint Sealant listed, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719 "Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)," to withstand the specified percentage change in the joint width existing at time of installation.

C. Acrylic-Emulsion Sealant: Provide product complying with ASTM C 834 "Specification for Latex Sealants," that accommodates joint movement of not more than 5 percent in both extension and compression for a total of 10 percent.

D. Butyl Sealant: Manufacturer's standard one-part, non-sag, solvent-release-curing, polymerized butyl sealant complying with ASTM C 1311 "Standard Specification for Solvent Release Sealants," and formulated with minimum of 75 percent solids to be nonstaining, paintable, and have a tack-free time of 24 hours or less.

E. Acoustical Sealant: Manufacturer's non-drying, non-bleeding and non-hardening butyl sealant complying with ASTM C 834 "Specification for Latex Sealants," and the following requirements:

1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E 90 "Test method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements."

2.3 ACCESSORIES

A. Tape: Manufacturer's standard, solvent-free, butyl-based tape sealant with a solids content of 100 percent formulated to be nonstaining, paintable, and nonmigrating in contact with nonporous surfaces with or without reinforcement thread to prevent stretch and packaged on rolls with a release paper on one side.

- B. Pre-compressed Foam: Manufacturer's standard preformed, pre-compressed, impregnated open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water repellent agent; factory-produced in pre-compressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer; and complying with the following requirements:
1. Properties: Permanently elastic, mildew-resistant, nonmigratory, nonstaining, and compatible with joint substrates and other sealants.
 2. Impregnating Agent: Manufacturer's standard.
 3. Density: Manufacturer's standard.
 4. Backing: Pressure-sensitive adhesive factory applied to one side with protective wrapping.
- C. Backing Rods (Joint Sealant Backing):
1. General: Provide sealant backings of material and type that are nonstaining; 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.
 2. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 - a. Open-cell polyurethane foam.
 - b. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
 - c. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
 - d. Any material indicated above.
 3. Elastomeric Tubing Joint Fillers: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, capable of remaining resilient at temperatures down to -26 deg 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.
 4. 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.
 5. Acoustical Sheet Caulking for junction boxes: LOWRY'S Electrical Box Sealer, or TREMCO INC. sheet caulking
- D. Miscellaneous Materials:
1. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.
 2. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.
 3. Masking Tape: Non-staining, nonabsorbent material compatible with sealants and surfaces adjacent to joints. Use the type of masking tapes available that is compatible to the substrate being masked without damaging the surface material of finish when removed.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which, affect the execution of work under this specification section.
 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing sealants to comply with recommendations of joint sealant manufacturer and the following requirements:
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old sealants, 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 sealants. 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 nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of sealants.
- B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
1. Masking Tape: Use the appropriate masking tape (type selected to the substrate so as not to mar the surface it is protecting) where required to prevent contact of sealant with adjoining surfaces that 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.

3.3 INSTALLATION

- A. General:

1. Comply with joint sealant manufacturer's written installation instructions applicable to products and applications indicated, except where more stringent requirements apply. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 "Standard Guide for Use of Joint Sealants," for use of sealants as applicable to materials, applications, and conditions indicated.
 - a. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 "Practice for Use of Sealants in Acoustical Applications," as applicable to materials, applications, and conditions indicated.
 - b. Use Urethane Sealants at painted joints.
 - c. Use Silicone Sealants at exposed, non-painted joints.
 - d. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:
 - 1) Install joint fillers of type indicated 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 that 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 that have become wet prior to sealant application and replace with dry material.
 - 2) Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.
 - e. 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 that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.
 - 1) For normal moving joints not subject to traffic: Fill joints to a depth equal to 50% of joint width, but not less than 1/4" deep or more than 1/2" deep. In no case shall the applied sealant width exceed the sealant depth.
 - 2) Assure that the *bond line* surface is a minimum of 1/4" wide. Install approved backer material at a proper depth to provide sealant bead profiles as detailed on approved shop drawings. Backer material shall be of appropriate size and shape and shall be compressed between 25% and 50% when installed.
 - 3) Backer material may not be modified in-lieu of using the properly dimensioned material. Install, when required a polyethylene, or other approved, bond backer tape to provide sealant bead profiles as detailed on approved shop drawings.
 - f. Do not allow sealants, primers, or other compounds to overflow, spill or migrate into voids of adjacent construction.
 - g. Remove excess sealant spillage promptly as this work progresses. Clean adjacent surfaces by recommended means to remove sealant, but not damage the surfaces. Remove all cartons and debris from the site as the work progresses and at the end of each work day. Joints shall be prepared and sealed on the same working day.
 - 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 that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

- 1) Provide concave joint configuration per Figure 5A in ASTM C 1193 "Standard Guide for Use of Joint Sealants," unless otherwise indicated.
 - 2) Provide flush joint configuration, per Figure 5B in ASTM C 1193 "Standard Guide for Use of Joint Sealants," where indicated.
 - a) Use masking tape to protect adjacent surfaces of recessed and tooled joints.
 - 3) Provide recessed joint configuration, per Figure 5C in ASTM C 1193 "Standard Guide for Use of Joint Sealants," of recess depth and at locations indicated.
- i. Installation of Preformed 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 written directions for installation methods, materials, and tools that 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 written recommendations.
 - j. Acoustical Sealant Applications:
 - 1) Provide acoustical sealant to form an airtight seal at all penetrations and perimeter of sound-rated partitions, floors and ceilings. Comply with requirements of specification section titled Gypsum Board. Use backer-rod where gaps to be sealed exceed 3/8 inches.
 - 2) Provide sheet caulking to seal the back and sides of all junction boxes (4 gang and smaller) recessed in acoustically-rated partitions.
 - 3) Provide acoustical sealant as a continuous bead along gypsum board face layer at all head and sill conditions of sound-rated partitions and around the perimeter of resilient ceilings.
 - k. Firestop Sealants: In accordance with applicable UL Classified numbers compatible with products provided.

3.4 CLEANING

- A. Clean in accordance with Specification - PROJECT CLOSEOUT.
 1. Clean any soiled surfaces immediately.
 2. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated sealants immediately so that and installations with repaired areas are indistinguishable from original work.

3.6 SCHEDULES

- A. Sealant Schedule:

- B. Sealants: Description of joint construction and location where sealant is typically applied
1. One-Part Neutral Cure Silicone Sealant:
 - a. Exterior and interior joints in vertical surfaces of concrete and masonry.
 - b. Between concrete masonry and stone.
 - c. Between metal and concrete, mortar, and stone.
 - d. Interior and exterior perimeter joints of fiberglass frames in exterior walls.
 - e. Exterior overhead joints.
 - f. Use the applicable sealant for continual immersion in water applications, such as swimming pools, fountains and cooling towers – USDA Approved.
 2. One-Part Acid-Curing Silicone Sealant:
 - a. Exposed joints within glazed curtain wall framing systems, skylight framing systems, and aluminum entrance framing systems, if applicable.
 3. One-Part Mildew-Resistant Silicone Sealant:
 - a. White Grout Joints: Provide white silicone sealant material to match adjacent white grout joints in interior joints in vertical surfaces of ceramic tile in toilet rooms, showers, and kitchens.
 - b. Colored Grout Joints: Provide colored silicone sealant material to match adjacent colored grout joints in interior joints in vertical surfaces of ceramic tile in toilet rooms, showers, and kitchens.
 4. One-Part Gun Grade Urethane Sealant:
 - a. Exposed joints in pre-cast, masonry, window frame perimeters and similar types of construction joints.
 5. Multi-Component Gun Grade Urethane Sealant:
 - a. Control joints and window and door perimeters.
 6. Multi-Component Gun Grade Urethane Sealant (Fast Curing):
 - a. Plaza Decks.
 7. One-Part or Multi-Component Gun Grade Urethane Sealant (Security Sealant):
 - a. Control joints and window and door perimeters where sealant is exposed to physical abuse.
 8. One-Part Pourable Self-Leveling Urethane Sealant:
 - a. Exterior and interior joints in horizontal surfaces of concrete.
 - b. Exterior and interior joints in horizontal surfaces between metal and concrete, mortar, stone, and masonry surfaces.
 9. Multi-Component Pourable Self-Leveling Urethane Sealant (Fast Curing):
 - a. For use when walking surfaces require use within 24 hours of application without damage to joint surfaces.
 - b. Exterior and interior joints in horizontal surfaces of concrete.
 10. Acrylic-Emulsion Sealant:
 - a. Paintable joints for the following surfaces expected to receive field painting:
 - 1) Interior joints in vertical and overhead surfaces at perimeter of door frames (not requiring security grade sealant).
 - 2) Interior joints in gypsum board, plaster, concrete, and concrete masonry.
 - 3) All other interior field paintable joints not indicated otherwise.
 11. One-Part Butyl Sealant:
 - a. Primarily used for glazing seals where little or no movement is expected.
 12. Acoustical Sealant:
 - a. Joints to control dust, air, smoke and sound transmission, including under all exterior wall sill plates placed on top of Cast-In-Place Concrete slabs.

END OF SECTION

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SECTION 081613 - FIBERGLASS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 15 14 DRILLED ANCHORS
 - 4. 03 20 00 REINFORCEMENT
 - 5. 03 30 00 CAST-IN-PLACE CONCRETE
 - 6. 04 22 00 CONCRETE MASONRY UNITS
 - 7. 05 12 00 STEEL AND FABRICATIONS
 - 8. 07 60 00 SHEET METAL
 - 9. 07 92 00 SEALANTS
 - 10. 08 70 00 HARDWARE
 - 11. 08 80 00 GLASS
 - 12. 08 91 00 LOUVERS
 - 13. 09 22 16 METAL FRAMING
 - 14. 09 29 00 GYPSUM BOARD
 - 15. 09 72 00 WALL COVERING
 - 16. 09 91 00 PAINTING
 - 17. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

- A. Standards:
 - 1. In accordance with the following standards:
 - a. ANSI American National Standards Institute
 - b. ASTM American Society for Testing and Materials
 - c. NFPA National Fire Protection Association
 - d. SAE Society of Automotive Engineers
 - e. UL Underwriters laboratories

1.3 DEFINITIONS

- A. FRP: Fiberglass

- B. Glazing Stop: A formed fiberglass section used to secure glazing in a door or frame.

- C. Prepared Opening: Existing opening or wall constructed prior to installation of frame.

1.4 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Fiberglass Doors and Frames Assemblies:
 - 2. All doors and frames shall be heavy-duty for pool building environments, and resistant to chlorine gas.
- B. Performance Requirements:
 - 1. In accordance with allowable values and properties assigned and approved by CBC. It is the intention of this section and the drawings to form a guide for a complete and operable system. Any items not specifically noted but necessary for a complete and operable system shall be provided under this section.

1.5 SUBMITTALS

- A. General: Submit in accordance with Specification Section - SUBMITTAL PROCEDURES.
- B. Coordination Drawings:
 - 1. Submit installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.
 - a. Contractor shall check all drawings and verify all dimensions (including wall thickness) in the field prior to fabrication.
 - b. Contractor shall verify that shop drawings include all required materials and material clearances.
 - c. Provide setting drawings, templates, and directions for installing anchorage, including sleeves, concrete inserts, anchors, bolts, and items with integral anchors for installation coordination.
- C. Product Data:
 - 1. Include construction details, material descriptions, core descriptions, fabrication methods, dimensions of individual components and profiles, and finishes for each type of product indicated.
 - 2. Provide information indicating all the Structural Properties of the fiberglass materials
 - 3. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
- D. Shop Drawings.
 - 1. Specifications relating to FRP door thickness, resin type, core material, method of construction, finish color, type of glass and glazing, anchor systems, joint construction and complete warranty information.
 - 2. Manufacturer's printed instructions for preparation, installation and care requirements for installers and inspecting authorities.

3. Complete schedules or drawings of FRP doors and frames (and associated Builders Hardware) showing identifying mark numbers, door and frame types, typical elevations, nominal sizes, handing, actual dimensions and clearances, and required hardware preps and reinforcements.
 - a. Coordinate with door hardware schedule.
 4. Supporting reference drawings pertaining to frame mounting details, door light or louver installation, hardware locations, and factory hardware cutouts and reinforcements.
 - a. Elevations of each door design and frame configuration.
 - b. Details of doors, including vertical and horizontal edge details.
 - c. Frame details for each frame type, including dimensioned profiles.
 - d. Details and location of reinforcement and preparations for hardware.
 - e. Details of each different wall opening condition.
 - f. Details of anchorages, joints, and connection.
 - g. Details of accessories.
 - h. Details of moldings, removable stops, and glazing.
 - i. Details of louvers, including sizes and location in doors, where required.
- E. Samples.
1. Color Samples: Provide a complete set of available finish colors from the manufacturer for color selection upon request
- F. Quality Assurance/ Control Submittals:
1. Design Data
 2. Test Reports:
 - a. Water Tightness Test Reports.
- G. Closeout Submittals in accordance with the following:
1. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
 2. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
 3. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
 4. Warranty in accordance with Specification Section - WARRANTIES.
- 1.6 QUALITY ASSURANCE
- A. Qualifications:
1. Installer Qualifications:
 - a. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's written warranty requirements.
 2. Manufacturer/Supplier Qualifications:
 - a. Manufacturer shall be ISO 9001 certified and been engaged in the manufacture of FRP door and frame systems for a minimum of five (5) years documented experience prior to the start of this work, and who has a history of successful reduction acceptable to the Architect.
 - b. Firm experienced in successfully producing/supplying products, similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
 - c. Five (5) years minimum documented experience.
- B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the Project is located.
 - b. Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area
- C. Mock Ups:
1. Provide Mock-Ups prior to application of the final layer of the finished exterior wall material and prior to installation of any exterior wall cavity and interior materials.
 2. Fiberglass Frame Assembly:
 - a. Mock-Ups shall be of each type of opening assembly in every type of exterior wall assembly in which an opening occurs, shall integrate all other related work assemblies and shall be representative of the intended end use configuration.
 - 1) Provide a Mock-Up with a minimum opening size of 24 inches square for window opening.
 - b. Mock Ups will be used for establishing construction sequence, and installation requirements of materials, and creating water tight assemblies.
 - c. Mock-Ups may become part of the completed Work upon successful testing for water tightness.
 3. Installation:
 - a. The Project Inspector, the Architect, Contractor's Superintendent and Sub-contactor's Superintendent shall observe the installation of materials.
 - b. Installation crew for the Mock-Ups shall be the installers of the fiberglass frame systems for this project and installers, as necessary, of other related work assemblies.
 - c. Mock Ups shall include the installation of integral flashing, glazing, louvers, sheet metal flashing, sealants, water barriers and penetration flashing of exterior material systems and other materials of related work that makes the openings watertight.
 - d. Failed Mock Ups shall be removed and the assembly reinstalled until the water tightness test is successful
- D. Meetings:
1. Pre- Installation: Schedule prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems, which may impede planned progress and proper demolition of work.
 - c. Review structural load limitations of existing structure.
 2. Progress: Scheduled by the Contactor during the performance of the work.
 - a. Review for proper work progress.
 - b. Identify any problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
 3. Completion: Scheduled by the Contactor upon proper completion of the work.
 - a. Inspect and identify any problems.
 - b. Establish method and procedures to maintain protections while progressing to project completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 - 1. Products shall be individually wrapped.
 - 2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

- B. Acceptance at Site:
 - 1. Do not deliver doors and frames to project site until Installer is ready and the Site Conditions accommodate the installation of the frames.
 - 2. Damaged products will not be accepted.

- C. Storage and protection:
 - 1. Products shall be stored in a dry, protected area.
 - 2. Products shall be stored in locked storage building.
 - 3. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials and protect against wetting prior to use.
 - b. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.8 PROJECT CONDITIONS

- A. Existing Conditions:
 - 1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.9 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section - WARRANTIES.

- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Fiberglass Doors and Frames Ten (10) Years.

- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section - WARRANTIES. Warranty shall certify that the installation of all exterior Fiberglass Doors and Frames were done in accordance with the method and procedures established with the successful Mock-Up for water tightness.
 - a. Warranty period Five (5) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified Fiberglass Doors and Frames product manufacturer:
 - a. TIGER DOOR.
 - b. Acceptable alternative manufacturers:
 - 1) EDGEWATER FRP DOOR.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Mechanical Properties and Test Performance of Fiberglass Doors and Frames:
 - 1. Pultruded structural shapes for stiles, rails, frames, and astragals shall exhibit the following minimum longitudinal coupon properties (per ASTM):
 - a. Tensile strength (D638) 30,000 psi.
 - b. Compressive strength (D695) 30,000 psi.
 - c. Flexural strength (D790) 30,000 psi.
 - d. Flexural modulus (D790) 1,600,000 psi.
 - e. Shear strength (D2846) 4,500 psi.
 - f. Impact, notched (D256) 25 ft-lb/in.
 - g. Barcol hardness (D2853) 50.
 - 2. Core material shall exhibit the following coupon properties (per ASTM):
 - a. Core material must comply with the International Building Code (IBC) Chapter 26 requirements for use with a plastic skin.
 - b. Shear strength, longitudinal direction (C273) 68.2 psi.
 - c. Shear strength, transverse direction (C273) 25.8 psi.
 - d. Shear modulus, longitudinal direction (C273) 6940 psi.
 - e. Shear modulus, transverse direction (C273) 1878 psi.
 - f. Shear elongation, longitudinal direction (C393 short beam) 1.79 percent.
 - g. Shear elongation, transverse direction (C393 short beam) 2.72 percent.
 - h. Maximum facing stress, longitudinal direction (C393 short beam) 735 psi.
 - i. Maximum facing stress, transverse direction (C393 short beam) 289 psi.
 - j. Maximum core shear stress, longitudinal direction (C393 short beam) 63.8 psi.
 - k. Maximum core shear stress, transverse direction (C393 short beam) 24.9 psi.
 - l. Modulus of elasticity (E1) per 1-inch width, longitudinal direction (C393 short beam) 4.92E+04 psi.

- m. Modulus of elasticity (E1) per 1-inch width, transverse direction (C393 short beam) 1.97E+04 psi.
 - n. Maximum facing stress, longitudinal direction (C393 long beam) 9011 psi.
 - o. Maximum facing stress, transverse direction (C393 long beam) 4727 psi.
 - p. Maximum core shear stress, longitudinal direction (C393 long beam) 48.3 psi.
 - q. Maximum core shear stress, transverse direction (C393 long beam) 23.5 psi.
 - r. Modulus of elasticity (E1) per 1-inch width, longitudinal direction (C393 long beam) 1.14E+05 psi.
 - s. Modulus of elasticity (E1) per 1-inch width, transverse direction (C393 long beam) 7.23E+06 psi.
 - t. Stiffness "D", longitudinal direction (C393 long beam) 379,270 psi.
 - u. Stiffness "D", transverse direction (C393 long beam) 260,608 psi.
 - v. Compressive strength (C365) 53 psi.
 - w. Compressive strength (C365) 2110 psi.
 - x. Density (C271) 2.42 lb/ft².
3. Adhesive shall exhibit the following minimum coupon properties (per SAE):
- a. Tensile strength (D882 modified) minimum 2,000 psi.
 - b. 8 day 25 degree C at 100 percent humidity Cross Peel (SAE J1553) minimum 330 psi.
 - c. 7 day immersion in seawater Cross Peel (SAE J1553) minimum 330 psi.
 - d. 30 day immersion in saltwater Cross Peel (SAE J1553) minimum 330 psi.
 - e. 72-hour immersion in gasoline Cross Peel (SAE J1553) minimum 330 psi.
 - f. 72-hour immersion in 20 percent sulfuric acid Cross Peel (SAE J1553) minimum 300 psi.
 - g. ANSI A 250.4 1,000,000 Cycle Test:
 - h. 4' x 8' door (up to a full light) and frame successfully tested in excess of 1,000,000 cycles with no failure of any of the design features of the door and frame.

B. Heavy Duty Fiberglass (FRP) Doors:

- 1. Design: FRP doors shall be of seamless press-molded construction. Laminated FRP face sheets shall be applied while wet and uncured to an internal door style and rail subframe/core assembly and then press-molded under heat and pressure.
 - a. The composite door panel shall be integrally fused over its entire surface area, not just adhesive-bonded at perimeter stiles and rails.
- 2. Doors shall remain under pressure during curing for flat, warp-free surfaces.
- 3. Stiles & Rails: A high modulus pultruded FRP square or rectangular tube subframe shall be provided within the door.
 - a. Tubes shall be mitered and joined internally at the corners with solid polymer blocks to yield a one-piece unit that does not require any secondary external sealing.
 - b. Provide a tubular midrail across width of the door at lock height, and additional horizontal rails where specific design conditions dictate.
 - c. Doors shall incorporate molded-in FRP edge strips, chemically bonded to the subframe stiles, for machining of hardware mortises so as not to cut or otherwise compromise the integrity of the pultruded stiles, nor allow moisture to penetrate into the core of the door.
 - d. All connections shall be chemically welded.
 - e. No mechanical fasteners will be allowed.
- 4. The use or inclusion of aluminum, steel, gypsum or wood into stile and rail construction is not permitted.

5. Core: For maximum rigidity and compressive strength a triangular shaped 3/8" cell phenolic resin impregnated kraft paper honeycomb core shall be used.
 - a. Molding pressure and resin gel time shall be sufficient to allow for penetration of resin into the cellular structure of the core to maximize shear and peel strengths as the skin/core interface and eliminate the possibility of delamination.
 - b. The honeycomb shall be completely enclosed within the stile and rail subframe.
6. Use of foam or balsa wood is not permitted.
7. Internal Reinforcement: High-Modulus pultruded tubular FRP, high-density polymer compression blocks, or plastic compression blocking at all hardware locations, and corner locations.
 - a. No wood blocking, steel or aluminum reinforcing plates, ribs or fittings shall be used.
8. A minimum of 900 lbs of pullout strength is required for each factory supplied hinge screw.
9. Faces: Door facings shall utilize a chemical resistant thermosetting polyester resin system with fiber reinforcing layers.
 - a. Supplier shall furnish door faces as shown on the drawings and in the door elevations.
 - b. Chopped strand mat layers shall be used to provide bond integrity between gelcoat, laminated facings and with layers of uni-directional glass fiber oriented in both the vertical and horizontal directions for high stiffness, impact resistance and resistance to warping.
10. Gelcoat surface integrally molded to be 25/30 mils thick (wet) ultra-violet light stabilized marine grade NPG-isophthalic polyester gelcoat.
11. Finish: The exposed FRP door faces shall have a 3-4 mils (wet) factory-applied two-part aliphatic polyurethane fully cured coating of industrial urethane.
 - a. Coating shall have a minimum hardness of H to 2H.
12. Finish shall be a slightly textured semi-gloss to minimize the visual effects of wear and tear.
13. Astragals: All pairs of doors shall be furnished with an astragal from door manufacturer made of same pultruded FRP material as door stile, rail and edge as required.
 - a. Astragal shall be located on the meeting stile edge of each inactive leaf of double door pairs.
14. Architect shall advise active leaf of door, and astragal shall be installed to cover meeting stile gap to effect seal and security.
15. Metal, PVC, vinyl or other non-fiberglass louvers are not acceptable for non-fire rated openings.
16. Raised panels and plants: All doors shown in elevation to have raised panels or plants shall be equipped with plants in configuration as shown on plans and in door schedule.
 - a. Plants shall be applied by the door manufacturer as an integral part of the door face.
 - b. Plants shall be bonded to the door skin; no mechanical fasteners shall be permitted.
 - c. All applied moldings shall be of resin material, and shall be installed by the manufacturer to resemble a raised panel door.
17. Field applied plants or moldings shall not be acceptable.
18. Provisions for louvers shall be performed during manufacture and shall not be attempted in the field.
 - a. Cutouts are to totally enclosed by pultruded FRP stiles and rails incorporated into door structure.
19. Light and louver cutouts that expose core material are not acceptable.

- C. Heavy Duty Fiberglass (FRP) Frames:
1. Design: FRP Door Frames furnished under this specification shall utilize a high-modulus pultruded structural FRP shape.
 2. The frame section shall be standard double rabbeted 5-3/4" deep x 2" face, 3/16" thick, with integral 5/8" doorstop with 1-15/16" soffits, to match typical hollow metal configurations.
 3. Corner Joints: Frame jambs and header shall be joined at corners via miter connections with hidden FRP angle clips and associated fasteners.
 - a. Pot and Beam corners will not be acceptable.
 4. Exposed fasteners for miter connections will not be acceptable except for wrap wall applications.
 5. Hardware Reinforcements: FRP reinforcing shall be chemically welded to door frame material at required locations.
 - a. Minimum screw pullout strength of 1100 lb per #12 x 1" sheet metal screw is required.
 6. Mechanically fastened reinforcements are not permitted.
 7. Anchors:
 - a. BOLT-IN: Provide manufacturer's required number of 3/8" diameter x 4" long flat head stainless steel sleeve anchors for masonry openings, 3/8" x 4" machine screw with nut and washers for structural steel openings, #14 x 4" long stainless steel flat head sheet metal screws for wood or steel stud openings.
 - b. Include extra anchors for additional frame height in two foot increments above 8'-0".
 - c. Provide single bolt anchor at center of all headers over four feet in nominal width.
 - d. Stainless steel fasteners shall be furnished by the factory.
 - e. GROUT-IN: Provide manufacturer's required number of wire or strap type masonry anchors for installation into block wall.
 8. Fill frame cavity with grout.
 9. Finish: Frames shall have a 3-4 mils (wet) factory applied two-part aliphatic polyurethane fully cured coating of industrial urethane.
 - a. Industrial urethane chemical coating color topcoat, to match the color and sheen of the doors, for superior weatherability.
 10. Gelcoat may not be sprayed onto the frame as a secondary coating.
- D. Fiberglass (FRP) Fixed Window
1. Design: FRP Fixed Window furnished under this specification shall utilize a high-modulus pultruded structural FRP shape.
 2. The fixed sash and window frame section shall be standard double rabbeted 5-3/4" deep x 2" face, 3/16" thick, with integral 5/8" stops to match typical hollow metal configurations.
 3. Corner Joints: Frame jambs and header shall be joined at corners via miter connections with hidden FRP angle clips and associated fasteners. Post and beam corners will not be acceptable.
 4. Butt Joints: All mechanically fastened butt joints shall be secured with hidden fasteners and internal FRP tube blocking.
 5. Hardware Reinforcements: FRP reinforcing shall be chemically welded to fixed sash and window frame material at required locations. Mechanically fastened reinforcements are not permitted.
 6. Anchors:

- a. **BOLT-IN:** Provide manufacturer's required number of 3/8" diameter x 4" long flat head stainless steel sleeve anchors for masonry openings, 3/8" diameter x 4" machine screw with nut and washers for structural steel openings, #14 x 4" stainless steel flat head sheet metal screws for wood or steel stud openings. Include extra anchors for additional frame height in two foot increments above 8'-0". Provide single bolt anchor at center of all headers over four feet in nominal width. Stainless Steel fasteners shall be furnished by the factory.
 - b. **GROUT-IN:** Provide manufacturer's required number of wire or strap type masonry anchors for installation into block wall. Fill frame cavity with grout.
 7. **Finish:** Fixed sash shall have a 3-4 mils (wet) factory applied two-part aliphatic polyurethane fully cured coating of industrial urethane.
 - a. Industrial urethane chemical coating color topcoat, to match the color and sheen of the doors, for superior weatherability.
 - b. Gelcoat may not be sprayed onto the frame as a secondary coating.
- E. **Fiberglass Louver:**
1. Flat blade louvers with 19 gage stainless steel wire bird screen shall be factory furnished and installed.
 2. All louvers and louver trim shall be manufactured exclusively from putrudded FRP profiles with a minimum fiberglass content of 50%.
 3. All louvers shall be coated to match door in color and sheen.
 4. Louver minimum thickness shall be 3/16" thick, 3" apart.
 5. Provide Insect Screens at exterior locations.

2.3 ACCESSORIES

- A. **Grout:**
1. **Concrete Walls:** Comply with ASTM C476 "Standard Specification for Grout for Masonry," with a maximum slump of 4 inches, as measured according to ASTM C 143/C143M "Standard Test Method for Slump of Hydraulic-Cement Concrete.
 2. **Masonry Walls:** Mortar comply with Specification Section - CONCRETE MASONRY UNITS.
- B. **Glazing Stops:**
1. Provide channel shaped removable Glazing Stops to secure glazing material or panels. Glazing Stops shall be continuous and have butted hairline corner joints.
 - a. Shall be fabricate from the same material as Frames
 - b. Coordinate stop depth and rabbit width between fixed and removable stops with type of glazing and type of installation indicated.
 - 1) Stop Depth 5/8" depth minimum.
 - c. Drill and stops for countersinking and concealment of fasteners uniformly spaced at 9 inches o.c. maximum and not more that 2 inches maximum from each corner.
- C. **Insect Screens:**
1. **Screen:**
 - a. 14-18 mesh stainless steel screen
 - b. Framed screens shall be shipped loose for field installation.
 - c. Screens shall mount flush with the interior face of the Fixed Louvers.
 2. **Mullion Covers:**

- a. Provide manufacturer's compatible mullion cover constructed of the same materials and finish as the louvers and shall be provided for the interior face.
 - b. Mullions shall be shipped loose for field installation.
- D. Sealants: Comply with Specification Section - Sealants.
- 1. Sealants Shall be compatible with glazing and frames.
- E. Fasteners:
- 1. All fasteners for all hardware shall be type 304 CRSS (18-8 series corrosion resistant stainless steel) with no exception.
 - 2. No carbon steel or aluminum components shall be used.
- F. Hardware:
- 1. Doors shall be factory mortised and drilled for mortise template butt hinges, with #12 x 2" long stainless steel screws pre-installed for hinge attachment.
 - 2. Provide 161 cylindrical lock bore, rim deadbolt, ANSI 86 mortise lock edge prep and pocket, or flushbolt cutouts as required.
 - 3. Frames shall be factory machined and drilled for all hardware requiring mortises, with #12 x 1" long stainless steel screws pre-installed for hinge attachment.
 - 4. Hardware shall be furnished as listed in Specification Section - HARWARE, or as designated in appropriate section, and shall be coordinated by the General Contractor and installed by experienced mechanics.
 - 5. Supplier shall furnish manufacturer's standard templates, installation instructions, or full size approved door and frame preparation instructions as approved by the architect and as required by the door and frame manufacturer prior to door and frame factory initiated manufacture.
- G. Standard factory lead-time for production of FRP doors and frames shall commence only when all distributor required preparation information is received and acknowledged by the door and frame manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
- 1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affects the execution of work under this specification section.
 - 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 - 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Coordination:
- 1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

2. Factory mark all doors and frames using a chemical resistant plastic tag or indelible marker with identifying number, keyed to shop drawings. Prior to shipment.

B. Protection:

1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:

1. Prepare surface in accordance with manufacturer's instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
3. Prior to installation, all frames with temporary spreaders removed, shall be checked for size, and swing, and corrected to installation tolerance for squareness, alignment, twist and plumbness. Securely brace frames and maintain installation tolerances within the following limits.
 - a. Opening Width: Plus 1/16 inch, minus 1/32 inch, measured from rabbet to rabbet at top, middle and bottom of frame.
 - b. Opening Height: Plus 1/16 inch, minus 1/32 inch, measured measured vertically between the frame head rabbet and top of floor or bottom of frame minus jamb extension at each jamb and cross the head.
 - c. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - d. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - e. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines and perpendicular to plane of wall.
 - f. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
4. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

B. Layout:

1. Lines shall be straight and true.

C. Frames: Install in strict accordance with manufacturer's printed instructions. Set plumb and square, using shims for bolt-in of existing openings, or wood bracing prior to grouting of jambs. Use at least two 2" x 6" wood spreaders inside frame to maintain critical opening dimensions during grouting.

- D. Doors: Hang per manufacturer's printed instructions using special screws provided for hinge attachment. Install doors to swing freely and to stand open at any angle. After installation, make final adjustments to hardware to allow for proper door operation and latching. All surface applied hardware shall be thru bolted.

- E. Glazing Stop:
 - 1. Coordinate and comply with installation requirements for all glazing indicated and specified.
 - 2. Secure Glazing Stops to frames and doors with stainless steel countersunk flat or oval-head machine screws.
 - a. All exterior screws (head, jamb and sills) shall be attached with a bed of sealant at the penetration point into the frame for a positive seal against water intrusion.
 - b. Countersink fasteners, fill with body putty, sand smooth and flush with no voids or ridges. Conceal installed fasteners as to be invisible at exposed faces.
 - 3. All exterior stops shall receive a full bed of sealant at back channel leg for the full length of opening, during final glazing installation for positive seal against water intrusion.
 - a. Coordinate sealants with the requirements of the glazing specified.

3.4 FIELD QUALITY CONTROL

- A. Site Tests:
 - 1. As required by Regulatory Requirements.
 - 2. Mock-Up Assemblies:
 - a. Water Spray Test: Upon completion of the installation of the Mock-Up Assembly, conduct test for water penetration in according to AAMA 501.2 requirements.
 - 1) The Project Inspector, the Architect, Contractor's Superintendent and Sub-contractor's Superintendent shall visually inspect for water penetration.
 - 2) A Thermal Imaging process conducted by a Owner's Testing Laboratory Service, shall be used for additional inspection for water penetration.
 - 3) Cost of additional testing and inspection required due to failure for water tightness shall be borne by the Contractor.
 - b. Reports:
 - 1) Project Inspector and/or Owner's Testing Laboratory Services shall provide a written report noting the installation and water tightness of the Mock-Up Assemblies tested.

- B. Inspection:
 - 1. As required by Regulatory Requirements.
 - 2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
 - 3. No work shall be without the inspections required by regulatory requirements.

3.5 CLEANING

- A. Clean in accordance with Specification Section - TEMPORARY FACILITIES AND CONTROLS.
 - 1. Clean any soiled surfaces immediately.
 - 2. Clean any soiled surfaces at the end of each day, minimum.

3. Finish shall be clean and ready for the application of any additional finishes.
4. In accordance with manufacturer's instructions and recommendations.

3.6 PROTECTION

A. Protection from traffic:

1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 083113 – ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all materials, labor, equipment and services necessary to furnish and install Equipment Access Doors, accessories and other related items necessary to complete Project as indicated by the Contract Documents unless specifically excluded.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 06 10 00 ROUGH CARPENTRY
 4. 08 16 13 FIBERGLASS DOORS AND FRAMES
 5. 09 22 16 METAL FRAMING
 6. 09 24 00 CEMENT PLASTER
 7. 09 29 00 GYPSUM BOARD
 8. 09 30 00 TILE
 9. 09 91 00 PAINTING
 10. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 11. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data.
 - a. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
 - b. Submit manufacturer's standard color range for selection by the Architect.
 2. Shop Drawings.
 - a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
 3. Closeout Submittals in accordance with Specification Sections in Division One:
 - a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - c. Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.
 - d. Warranty in accordance with Specification Section - WARRANTIES.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - b. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
2. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Meetings:

1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.4 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.

C. Installer's Warranty:

1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Specified product manufacturer:
 - a. MILCOR INCORPORATED, INC.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Access Doors:
1. Design: Equal to Style AP, DW, AT, K or M Access Door as manufactured by MILCOR INCORPORATED, Lima, Ohio.
 - a. Design shall match material conditions present in each specific location.
 - b. In Cement Plaster locations, provide not less than 16 gage frames with a minimum of 24 gage expanded or perforated metal wings designed to finish flush with plaster.
 2. Size: Refer to Architectural, Plumbing, Mechanical, and Electrical Drawings.
 3. Material: Stainless Steel Frame and Door.
 4. Operation: Manual
 5. Lock: Key operated cylinder lock.
 6. Finish: Brushed Stainless Steel.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
 2. Coordinate access doors with related items specified under other Sections to ensure proper and adequate interface of work. Particular attention is called to all Plumbing, Mechanical, and Electrical Specifications and drawings and the full cooperation required with that subcontractor's needs and work.

3.2 INSTALLATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

END OF SECTION

SECTION 083300 – COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install all Coiling Doors, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - a. Types of Overhead Doors:
 - 1) Counter Shutters (Non-Rated).
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 03 30 00 CAST-IN-PLACE CONCRETE
 4. 04 22 00 CONCRETE MASONRY UNITS
 5. 05 12 00 STEEL AND FABRICATIONS
 6. 06 10 00 ROUGH CARPENTRY
 7. 08 70 00 HARDWARE
 8. 09 22 16 METAL FRAMING
 9. 09 24 00 CEMENT PLASTER
 10. 09 29 00 GYPSUM BOARD
 11. 09 91 00 PAINTING
 12. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 13. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. Standards:
1. In accordance with the following standards:
 - a. FMG Factory Mutual Global.
 - b. ITS Intertek Testing Services.
 - c. NEMA National Electrical Manufacturers Association.
 - d. NFPA National Fire Protection Association.
 - 1) Provide assemblies, when applicable, complying with NFPA 80 that are identical to door and frame assemblies tested for fire-response characteristics per UL 10b and NFPA 252, and that are listed and labeled for fire-ratings indicated by UL, FMG, ITS, or another testing and inspection agency acceptable to **DSA/FLS**.
 - 2) Provide certification by a testing agency acceptable to **DSA/FLS** that oversized fire-rated door assemblies, when applicable, comply with all standard construction requirements of tested and labeled fire-rated doors assemblies except for size.

- 3) Provide electrical components, devices and accessories, when applicable, that are listed and labeled as defined in NFPA 70, Article 100.
- e. UL Underwriters Laboratories Inc.

1.3 DEFINITIONS

- A. The following definitions apply to the products of this Specification Section:
 - 1. Astragal: Weatherstripping attached to the Bottom Bar.
 - 2. Barrel: The assembly containing the counterbalancing springs of the unit.
 - 3. Between Jamb Mounted: Unit installed between the jambs of the opening.
 - 4. Bottom Bar: Bottom element of a coiling door or grille that rests on the sill or floor.
 - 5. Bracket: Plates at each end of the door that are bolted to the guides to support the barrel and curtain assembly.
 - 6. Curtain: The main body of the door that can be made up of slats, rods or links.
 - 7. End Locks: Metal pieces attached to the ends of the slats to prevent lateral shifting.
 - 8. Face Of Wall Mounted: Unit installed at the face of the jamb either inside or outside the structure.
 - 9. Guide: The side track of the door.
 - 10. Guide Weatherstrip: Vinyl or Neoprene material secured to the inside angle of the guide to prevent air infiltration.
 - 11. Hood: The sheet metal cover attached to the brackets to enclose the barrel assembly.
 - 12. Hood Baffle: A piece of waterproof canvas attached to the interior of the hood to prevent air infiltration.
 - 13. Inside Angle: Interior angle forming the channel in which the door goes up and down.
 - 14. Insulated Door: Door constructed with a double-slatted curtain filled with insulation.
 - 15. Service Door: Large, slatted doors used to close large openings in industrial and commercial applications.
 - 16. Slat: Interlocking metal shapes that comprise the curtain of the door.
 - 17. Stop: Metal pieces attached to the guide to prevent the bottom bar from going up into the hood.
 - 18. Torsion Springs: Springs wound clockwise or counter clockwise position to counterbalance weight.
 - 19. Wall Angle: The angle of the door guide attached to the wall that supports the bracket.
 - 20. Windlocks: Metal pieces attached to the ends of the slats that interlock with the windlock bar in the guide to prevent the curtain from blowing out of the guides.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 - 1. Product Data.
 - a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
 - 2. Shop Drawings.
 - a. Submit shop drawings prepared by, or under the supervision of a registered Civil or Structural Engineer in the State of California, detailing fabrication and assembly-- as well as procedures and diagrams-- of the work under this section. Include setting drawings, templates, and directions for installation of anchor bolts and other anchorage to be installed as unit of work of other related sections.

- b. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work.
 - 1) Where installed products are indicated to comply with certain design loadings, include structural computations, material properties, and other information needed for structural analysis that has been signed and stamped by a registered Civil or Structural Engineer in the State of California.
- c. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
- 3. Quality Assurance/Control Submittals:
 - a. Manufacturer's Written Instructions.
 - b. Manufacturer's Field Reports.
 - c. Engineering Calculations.
 - 1) Submit engineering calculations computed and signed by a registered Civil or Structural Engineer in the State of California.
- 4. Closeout Submittals in accordance with the following:
 - a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - c. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer Qualifications:
 - a. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
 - 2. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
- B. Regulatory Requirements:
 - 1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

1.6 OWNER'S INSTRUCTIONS

- A. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train the Owner's maintenance personnel as specified below:
 - 1. Test and adjust controls and any safeties. Replace damaged or malfunctioning controls and equipment.

1.7 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period Five (5) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified Overhead Coiling Door and Grille products manufacturer, or approved equivalent:
 - a. CORNELL/COOKSON COMPANY.
 - b. Acceptable alternative manufacturers:
 - 1) OVERHEAD DOOR CORPORATION.
 - 2) WAYNE DALTON.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MANUFACTURED UNITS

- A. Counter Shutters:
 - 1. Door Curtain Materials and Construction:
 - a. Verify the size of this overhead door with the operation.
 - b. Door Curtains: Fabricate overhead coiling door curtain of interlocking slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
 - 1) Stainless-Steel Curtain Slats (If applicable): ASTM A 666 "Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar," Type 304, #4 finish.

- a) Minimum Specified Thickness: Not less than 20 Gage (0.0375").
 - b) Flat profile slats.
 - c. Curtain Insulation (If applicable): Fill slat with manufacturer's standard rigid cellular polystyrene or polyurethane-foam-type thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials." Provide an "R" Value of at least 6.29. Enclose insulation completely within metal slat faces.
 - 1) Inside Curtain Slat Face: To match material of outside metal curtain slat.
- 2. Endlocks:
 - a. Service Door Endlocks and Windlocks: Malleable-iron casings galvanized after fabrication, secured to curtain slats with galvanized rivets or high-strength nylon. Provide locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.
 - b. Counter Shutter Endlocks: Manufacturer's standard locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.
 - 3. Bottom Bars:
 - a. Counter Shutters: Manufacturer's standard continuous channel or tubular shape, either stainless-steel or aluminum extrusions to suit type of curtain slats.
 - 1) Astragal: Provide a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene; for placement between angles or fitted to shape, as a cushion bumper for interior door.
 - 4. Curtain Jamb Guides:
 - a. Counter Shutter: Fabricate curtain jamb guides of angles or channels and angles of material and finish to match curtain slats, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise; with removable stops on guides to prevent overtravel of curtain.
 - 5. Seals:
 - a. Weatherseals: Provide replaceable, adjustable, continuous, compressible weather-stripping gaskets fitted to bottom and top of all doors (to minimize sound of operation regardless of weatherstripping requirements). At door head, use 1/8-inch thick, replaceable, continuous sheet secured to inside of hood.
 - 1) Provide motor-operated doors with combination bottom weatherseal and sensor edge.
 - 2) In addition, provide replaceable, adjustable, continuous, flexible, 1/8-inch thick seals of flexible vinyl, rubber, or neoprene at door jambs for a weathertight installation.
- B. Hoods:
- 1. Form round hoods to act as weatherseal and entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods, and provide fascia for any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sagging.

- a. Fabricate hoods for stainless-steel doors of minimum 0.025-inch thick stainless-steel sheet, Type 304, complying with ASTM A 666 "Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar."
 2. Counter Shutter Integral Frame, Hood, and Fascia: Provide welded assemblies of the following sheet metal:
 - a. Fabricate from minimum 0.0625-inch thick stainless-steel sheet, Type 304, complying with ASTM A 240 "Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications" or ASTM A 666 "Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar."
- C. Counterbalancing mechanism:
1. General: Counterbalance curtain by means of adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
 2. Counterbalance Barrel: Fabricate spring barrel of hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of curtain and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
 3. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Provide cast-steel barrel plugs to secure ends of springs to barrel and shaft.
 4. Fabricate torsion rod for counterbalance shaft of cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
 5. Brackets: Provide mounting brackets of manufacturer's standard design, either cast iron or cold-rolled steel plate, galvanized.
- D. Operators:
1. Push-up: Design counterbalance mechanism so required lift or pull for door operation does not exceed 25 lbf (111 N).
- E. Hardware:
1. Locking Devices: Fabricate locking device assembly with lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bar to engage through slots in tracks.
 - a. Locking Bars, full-disc cremone type, both sides, operable from inside only.
 - b. Lock Cylinder Specification Section – HARDWARE. Hardware Group 01. Verify with the Hardware supplier the type of cylinder required for the locking mechanism.
 2. Push/Pull Handles: For push-up-operated or emergency-operated curtains, provide manufacturer's standard lifting handles on each side of curtains. Maximum effort shall not exceed 30 pounds to pull/push up or down.
 3. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on single-jamb side, operable from coil side.

2.3 FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Stainless-Steel Finishes:
 - 1. Powder Coated: Manufacturer's "ColorCote" powder color coating system
 - a. Bonderized coating for prime coat adhesion
 - b. Factory applied Thermosetting Powder Coating applied with a minimum thickness of 2 mils.
 - c. The color shall be selected by the architect and shall be chosen from custom color selection.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
 - 1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
 - 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 - 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Coordination:
 - 1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
- B. Protection:
 - 1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
- C. Surface preparation:
 - 1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
 - 2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

- A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
 - a. Install fire-rated doors to comply with NFPA 80.
4. Set plumb, level, and square.

B. Layout:

1. Lines shall be straight and true.

3.4 ADJUSTING

- A. Lubricate bearings and sliding parts; adjust doors to operate easily, free of warp, twist, or distortion and with weathertight fit around entire perimeter.
- B. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.
 1. Test door closing when activated by detector or alarm-connected fire-release system. Reset door-closing mechanism after successful test.

3.5 CLEANING

- A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
 1. Clean any soiled surfaces immediately.
 2. Finish shall be clean and ready for the application of any additional finishes.
 3. In accordance with manufacturer's written instructions and recommendations.

3.6 DEMONSTRATION

- A. In accordance with Specification Section - PROJECT CLOSEOUT.
 1. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train Owner's maintenance personnel as specified below.
 - a. Schedule training with the Owner's maintenance personnel with at least seven (7) days advance notice.
 - b. Train Owner's maintenance personnel on procedures and schedules related to start-up and shut-down, troubleshooting, servicing, and preventative maintenance.
 - c. Review data in "Operating and Maintenance Manuals." Refer to Specification Section - PROJECT CLOSEOUT.

3.7 PROTECTION

- A. Protection from traffic:
 1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.8 SCHEDULES

- A. Coiling Door Manufacturer, as described herein: CORNELL/COOKSON
- B. Counter Shutters, Non-Rated. See drawings for sizes:
1. Model Number: **CD10-1**
 - a. Mounting: Face of Wall.
 - b. Operation: Push-Up.
 - c. Slat Type: Slat #5 (Flat).
 - d. Curtain Gage: 20 ga. (0.0375").
 - e. Curtain Finish: Stainless Steel Slats.
 - f. Manufacturer's Dimensional Range: Up to 80 sq.ft. or 8 ft. in height.
 - g. Locking Device: Cylinder.
 - h. Remarks: N/A.

END OF SECTION

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SECTION 087000 – HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all Building Hardware materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 30 00 CAST-IN-PLACE CONCRETE
 - 4. 05 12 00 STEEL AND FABRICATIONS
 - 5. 06 10 00 ROUGH CARPENTRY
 - 6. 06 41 23 MODULAR CASEWORK
 - 7. 07 92 00 SEALANTS
 - 8. 08 16 13 FIBERGLASS DOORS AND FRAMES (
 - 9. 08 33 00 COILING DOORS
 - 10. 09 91 00 PAINTING
 - 11. 10 05 00 MISCELLANEOUS SPECIALTIES
 - 12. 32 19 19 ORNAMENTAL METAL
 - 13. 32 31 13 CHAIN LINK
 - 14. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - a. Alarm Systems and Power Interface.
 - 15. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. Standards:
 - 1. In accordance with the following standards:
 - a. ADA-S Americans with Disabilities Act 2010 Standards.
 - b. ASAHC American Society of Architectural Hardware Consultants.
 - c. BHMA Builders Hardware Manufacturers Association.
 - d. DHI Door and Hardware Institute.
 - e. HMMA Hollow Metal Manufacturer's Association.
 - f. NFPA National Fire Protection Association.
 - g. UL Underwriter’s Laboratories.
 - h. WHI Warnock Hersey Incorporated.

1.3 DEFINITIONS

- A. The following definitions apply to this Specification Section:

1. AFF Above Finished Floor.
2. "LABEL" Shall mean "FIRE DOOR ASSEMBLY" as defined in CBC Section 702.
3. LDW Less Door Width.
4. NRP Non Removable Pin.
5. POT Path of Travel (as defined by DSA/ACS and the CBC).

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

1. Coordination Drawings:
 - a. Submit installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.
2. Product Data.
 - a. Submit manufacturer's technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish (including any custom colors), and other information necessary to show compliance with requirements.
 - b. Provide Key Control System submittal for review prior to fabrication or ordering. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
 - c. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled
3. Shop Drawings – (Hardware Schedule):
 - a. Submit shop drawings (Hardware Schedule) showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work. Include the following information:
 - 1) Type, style, function, size and finish of each Hardware Item.
 - 2) Name and manufacturer of each item.
 - 3) Fastenings and other pertinent information.
 - 4) Location of each hardware set cross-referenced to indications on the drawings both on the floor plans and in door and frame (opening) schedule as prepared by the Architect.
 - 5) Explanation of all abbreviations, symbols, and codes contained in schedule.
 - 6) Mounting locations for hardware.
 - 7) Door and frame sizes and materials.
 - 8) Keying information.
 - b. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
 - c. Furnish as-built/as-installed schedule with close-out documents, including keying schedule, wiring/riser diagrams, manufacturers' installation, adjustment and maintenance information.
4. Quality Assurance/Control Submittals:
 - a. Certificates:
 - 1) Submit three (3) copies of certificates.
 - 2) Provide a letter on Contractor's Letterhead certifying work provided, meets or exceeds, the requirements of this Section.

- a) Provide a statement on the certificate that all hardware has been furnished in accordance with the Contract Documents.
 - b) Provide a statement on the certificate that all hardware has been installed correctly and in proper working order.
5. Closeout Submittals:
- a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - c. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
 - d. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:

- 1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
- 2. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
 - b. Firm must be a recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project, and that employs an experienced Architectural Hardware Consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.
 - 1) Responsible for detailing, scheduling and ordering of finish hardware.
 - 2) Supplier shall meet with the Owner to finalize keying requirements and to obtain final instructions in writing.
 - 3) Stock parts for products supplied and be capable of repairing and replacing hardware items found defective within warranty periods.

B. Regulatory Requirements:

- 1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. CBC General Requirements:
 - 1) Buildings on a K-12 Public School Campus shall be provided with locks which allow doors to classrooms and any room with an occupant load of five or more persons to be locked from the inside per CFC 1010.1.11.
 - a) Locks shall conform to the specification and requirements of Section 1010.1.9.
 - b) Exceptions include doors which are normally locked from the outside, relocatable moved within the same campus, and reconstruction projects.

- 2) Adjust closers so that beginning from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum, per CBC Section 11B-404.2.8.1.
- 3) Where Flush Bolts occur in the POT, they shall be Automatic Flush Bolts (accessible).
- 4) Lever handles shall return to within 1/2 inch off door face.
- 5) Hand-activated hardware shall be mounted between 34" to 44" AFF; lever-type hardware, panic bars, push-pull activating and lever for thumb-turn dead bolt hardware shall comply with CBC Section 11B-308 Reach Ranges and 11B-404.2.7 Door and Gate Hardware.
 - a) All hand activated hardware shall be easy to operate with one hand, without tight grasping, pinching, or twisting of the wrist to operate; the force required to activate operable parts shall be 5 pounds maximum, per 11B-309.4.
- 6) Force for pushing or pulling doors shall be a maximum of 5 lbs at exterior and interior doors per CBC Section 11B-404.2.9.
- 7) Thresholds in the POT shall be in conformance with CBC Section 11B-404.2.5.
- 8) All rated doors are to be positive latching and self-closing.
- 9) All 20 minute rated assemblies shall be provided with approved gasketing material so installed to provide a seal where the door meets the stop on both sides and across the top.
- 10) Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not.
 - a) Where emergency exit devices are required on fire-rated doors, (with supplementary marking on door's UL labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware."
- 11) Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

C. Certificates:

1. Provide a letter on Contractor's Letterhead certifying work provided, meets or exceeds, the requirements of this Section.

D. Meetings:

1. Pre-installation Conference: Scheduled by the Contractor prior to the start of work.
 - a. Review hardware schedule, products and installation procedures.
 - b. Review Owner's keying standards.
 - c. Coordinate the work with all other related work.
 - d. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress Meetings: Scheduled by the Contractor during the performance of the work.
 - a. Review proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
3. Final Inspection: Scheduled by the Contractor upon proper completion of the work.

- a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
- b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 - 1. Products shall be individually wrapped.
 - 2. Packaging of door hardware shall be the responsibility of the supplier.
 - a. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule.
 - 1) Two or more identical sets may be packaged in same container.
 - 3. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage. Damaged products will not be accepted at final inspection.
- B. Acceptance at Site:
 - 1. Products shall be labeled also with model numbers, catalog numbers, function and finish, identification related to final hardware schedule, and include basic installation instructions with each item or package.
 - 2. Damaged products will not be accepted.
- C. Storage and protection:
 - 1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.
 - 2. Provide secure lock-up for door hardware delivered to the Project, but not yet installed.
 - a. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

1.7 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Closers:
 - 1) Warranty Period Ten (10) Years.
 - a) Exception: Electronic Closers shall be Two (2) Years.
 - b. Exit Devices:
 - 1) Warranty Period Ten (10) Years.
 - c. All other hardware:
 - 1) Warranty Period Ten (10) Years.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section - WARRANTIES:

- a. Warranty period One (1) Year.

1.8 MAINTENANCE

A. Extra Materials:

- 1. Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.

- 1. Specified product manufacturer, or approved equivalent:
 - a. Hinges, Butts and Pivots HAGER HINGE CO.
 - 1) Acceptable alternative manufacturers STANLEY HARDWARE.
 - b. Continuous Hinges MARKAR.
 - 1) Acceptable alternative manufacturers PEMKO MANUF. CO.
 - c. Key Control System KEY CONTROL SYSTEMS, INC.
 - 1) Acceptable alternative manufacturers TELKEE INC.
 - d. Cylinders and Locks (Locksets) SCHLAGE LOCK DIV.
 - 1) "D" Series.
 - 2) Acceptable alternative manufacturers FALCON LOCK CO.
 - a) "T" Series.
 - 3) Acceptable alternative manufacturers BEST LOCK CO.
 - a) "9K" Series.
 - e. Bolts IVES.
 - 1) Acceptable alternative manufacturers GLYNN-JOHNSON CORP.
 - 2) Acceptable alternative manufacturers TRIMCO.
 - f. Exit / Panic Devices. VON DUPRIN.
 - 1) "98" Series, cylinder dogging, trim ANSI Function 03 #990NL-R.
 - 2) Acceptable alternative manufacturers PRECISION HARDWARE.
 - a) "1100" Series, cylinder dogging, trim ANSI Function 03 #17C.
 - g. Push / Pull Units IVES.
 - 1) Acceptable alternative manufacturers TRIMCO.
 - h. Overhead Closers LCN.
 - 1) Acceptable alternative manufacturers. NORTON DOOR CONTROLS
 - i. Door Control Devices IVES.
 - 1) Acceptable alternative manufacturers GLYNN-JOHNSON CORP.
 - 2) Acceptable alternative manufacturers TRIMCO.
 - j. Door Trim Units IVES.

- 1) Acceptable alternative manufacturers TRIMCO.
- k. Door Stops, General IVES.
 - 1) Acceptable alternative manufacturers TRIMCO.
- l. Toilet Room Door Stops McMASTER-CARR CO.
- m. Kick, Mop and Armor Plates IVES.
 - 1) Acceptable alternative manufacturers TRIMCO.
- n. Sliding Pocket Door Sets HETTICH INTERNATIONAL.
 - 1) Acceptable alternative manufacturers STANLEY HARDWARE.
- o. Door Weatherstripping and Sound / Smoke Seals PEMKO MANUF. CO.
 - 1) Acceptable alternative manufacturers NATIONAL GUARD.
- p. Thresholds PEMKO MANUF. CO.
 - 1) Acceptable alternative manufacturers NATIONAL GUARD.
- q. Astragals REESE.
 - 1) Acceptable alternative manufacturers HAGER HINGE CO.
- r. Adjustable Lightproof Door Kit FULLER & ALBERT, INC.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. General:

- 1. Base Metals: Produce hardware units of basic metal and forming method indicating using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified within this specification section for applicable hardware units for finish designations indicated.
- 2. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.
- 3. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.
- 4. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners.
 - a. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of reinforcing the work adequately to fasten the hardware securely.
 - b. Where thru-bolts are used as a means of reinforcing the work, provide sleeves for each thru-bolt or use sex screw fasteners.

2.3 MANUFACTURED UNITS

A. Hinges:

- 1. General:
 - a. Templates: Provide only template-produced units.
 - b. Provide Phillips flat-head screws complying with the following requirements:

- 1) For metal doors and frames, install machine screws into drilled and tapped holes.
 - 2) Finish screw heads shall match surface of hinges or pivots.
2. Butt:
- a. Provide hinge pins as follows:
 - 1) Out-Swing Exterior Doors Nonremovable pins.
 - 2) Out-Swing Corridor Doors with Locks Nonremovable pins.
 - 3) Interior doors Nonrising pins.
 - 4) Tips: Provide flat button and matching plug, finished to match leaves.
 - b. Provide the number of hinges indicated, but not less than the following guidelines:
 - 1) Doors with heights up to 60 inches 2 Hinges.
 - 2) Door with heights 61 to 90 inches 3 Hinges.
 - 3) Doors with heights 91 to 120 inches 4 Hinges.
 - 4) For doors with heights more than 120 inches, provide four hinges, plus one additional hinge for every 30 inches of door height greater than 120 inches.
 - c. Hinges shall be sized in accordance with the following:
 - 1) Height:
 - a) Doors up to 41" wide 4-1/2 inches.
 - b) Doors 42" to 48" wide 5 inches.
 - 2) Width: Sufficient to clear frame and trim when door swings 180 degrees.
3. Pivot:
- a. Pivots shall be high strength forgings and castings with precision bearings for smooth operation. Positive locking vertical adjustment mechanism to allow installer to precisely position the door and balance the load.
4. Continuous:
- a. Continuous hinges shall be UL rated as required.
 - b. Continuous hinges shall not obscure fire-rating labels of doors or door frames.
- B. Lock Cylinders and Keying:
1. Lock Cylinders:
 - a. Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.
 2. Keying:
 - a. Review the keying system with the Owner and provide the type required (Master, grandmaster or great-grandmaster), either new or integrated with the Owner's existing keying system.
 - 1) The Owner's existing Grandmaster System is "Classic" SCHLAGE Keyways:
 - a) Verify the district standard keyway..
 - 2) Equip locks with cylinders for construction-core pin tumbler inserts. Provide only temporary inserts for the construction period, and remove these when directed.
 - a) Provide final cores and keys prior to Architect's initial punch list.
 - b. Key Blanks: Provide Standard "6" pin bow key blank; tag to identify.
 - c. Provide keys manufactured from nickel silver only.
 - d. Supply keys and blanks as follows:
 - 1) Supply 2 cut change keys for each different change key code.
 - 2) Supply 1 uncut key blank for each change key code.
 - 3) Supply 6 cut master keys for each different master key set.
 - 4) Supply 4 uncut key blanks for each master key set.

- e. Comply with Owner's instructions for masterkeying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.
 - 1) Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE."
 3. Deadlocks: Rotating cylinder trim rings of attack-resistant design. Mounting plates and actuator shields of plated cold-rolled steel. Mounting screws of 1/4" diameter steel and protected by drill-resistant ball bearings. Steel alloy deadbolt with hardened steel roller. Strike alloy deadbolt with reinforcer and two 3" long screws. ANSI A156.5, 1992 Grade 1 certified.
- C. Key Control System:
1. Provide a key control system including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended in writing by system manufacturer, with capacity for 150 percent of the number of locks required for the Project.
 - a. Provide hinged-panel type cabinet for wall mounting, or multiple-drawer type cabinet. Coordinate location with the Architect. Provide submittal for review before fabrication or ordering.
- D. Locks, Latches, and Bolts:
1. All doors shall be operable from within, without the use of a key by merely rotating the latching handle.
 2. All doors in areas used by students shall be self-releasing type, operable from within without the use of a key or special knowledge or effort.
 3. Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set, unless otherwise indicated.
 4. Lock Protectors:
 - a. Lock astragals shall be provided with internally threaded fasteners for flat head machine screws. No hex head or carriage bolt fasteners will be permitted.
 - b. Must be through bolted to door.
 5. Provide 5/8 inch minimum throw of latch on pairs of doors. Comply with UL requirements for throw of bolts and latch bolts on fire rated fire openings.
 - a. Provide 1/2 inch minimum throw of latch for other bored and preassembled types of locks
 - b. Provide 3/4 inch minimum throw of latch for mortise locks.
 - c. Provide 1 inch minimum throw for all dead bolts.
 6. Provide flush bolt heads a minimum of 1/2 inch diameter rods of brass, bronze, or stainless steel with minimum 12 inch long rod for doors up to 7'-0" in height.
 - a. Provide longer rods as necessary for doors exceeding 7'-0" in height.
 - b. Automatic Flush Bolts shall be of the low operating force design. Utilize the top bolt only model for interior doors where applicable and as permitted by testing procedures.
 - c. Manual Flush Bolts only permitted on storage or mechanical openings as scheduled.
 - d. Provide dust-proof strikes at openings using bottom bolts.
 7. Provide keyed dogging devices on doors equipped with exit devices.
 - a. Do not provide keyed exit devices on fire rated doors equipped with exit devices.
 8. Where rabbeted door stiles are indicated, provide special rabbeted front on lock and latch units and bolts.

9. Locksets and Latchsets in Acoustical Doors And Frames require a 3-3/4" backset; verify and coordinate.
 10. All egress doors shall comply with AB 211 (2009-2010).
- E. Exit / Panic Devices:
1. Panic hardware shall comply with CCR Title 24, Part 12, Chapter 12-10-302 (a).
 - a. The release mechanism shall be so designed that a horizontal force of 15 lbs. or less will actuate the release bar and latches applied in the direction of travel.
 2. No surface mounted vertical rods are allowed.
 3. Provide certificate by independent testing laboratory that device has completed over 1,000,000 cycles and can still meet ANSI/BHMA A156.3 standards.
 4. Device shall bear UL label for fire and or panic as may be required.
 5. Removable Mullions:
 - a. Removable with single turn of building key, and securely reinstalled without need for key.
 - b. All removable mullions shall be steel or aluminum clad steel whether or not the opening is fire-rated or not.
 6. No manual Flush Bolts on egress doors.
- F. Push / Pull Units:
1. Provide manufacturer's standard exposed fasteners for installation, thru-bolted for matched pairs but not for single units.
- G. Closers and Door Control Devices:
1. Door closer cylinders shall be of high strength cast iron construction with double heat treated pinion shaft to provide low wear operating capabilities of internal parts throughout the life of the installation.
 - a. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory.
 - b. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.
 2. Except as otherwise specifically indicated, comply with manufacturer's written recommendations for size of door control unit depending on size of door, exposure to weather, and anticipated frequency of use.
 - a. Where parallel arms are indicated for closers, provide closer unit one size larger than recommended for use with standard arms.
 - b. Effort to operate shall conform to CBC Section 11B-404.2.9 accessibility requirements as follows:
 - 1) Exterior/Interior doors 5.0 pounds maximum.
 - a) The Authority having Jurisdiction may increase the maximum effort to operate Fire Doors to achieve positive latching, but not to exceed 15 lbs maximum.
 3. Where manual closers are indicated for doors required to be accessible, provide adjustable units complying with ANSI A 117.1 and CBC Section 11B-404.2.8 provisions for door opening force and delayed action closing.
 4. Where combination door closers and holders are indicated, provide units designed to hold door in an open position under normal usage and to release and close door automatically under fire conditions.
 - a. Incorporate an integral electromagnetic holder mechanism designed for use with UL listed fire detectors, provided with normally closed switching contacts.

- b. When indicated, provide integral smoke detector device in combination door closers and holders complying with UL 228, Second Edition.
 - 5. Provide gray resilient parts for exposed bumpers.
 - 6. Closures indicated for use on Acoustical Doors and Frames shall allow for a minimum 1/2" up-down movement due to the Cam-Lift hinges.
- H. Floor Closers:
- 1. Shall be equipped with compression springs, cam and roller operating mechanism and a one piece spindle-cam for maximum operating performance and longevity.
- I. Kickplates:
- 1. Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine screws or self-tapping screws.
 - 2. Fabricate edge trim of stainless steel to fit door thickness in standard lengths or to match height of protection plates.
 - 3. Fabricate protection plates not more than 1-1/2 inches less than door width on hinge side and not more than 1/2 inch less than door width on pull side by height indicated.
 - a. Protection plates shall be stainless steel, 0.050 inch (18 gage).
- J. Door Stops:
- 1. At all Toilet Room Partition Doors, provide stops at adjacent walls or partitions. Stops shall be aligned with the top and bottom of Toilet Partition Doors, and shall be installed on both the Door and the adjacent wall or partition.
 - a. Provide neoprene spring rubber rod, 1-1/2" diameter, as manufactured by McMASTER CARR CO., or approved equivalent. Polish exposed surfaces. Secure with Stainless Steel Fasteners.
 - 2. Coordinate the installation of backing in walls with the door supplier, aligned with the top and bottom of doors.
 - 3. Unless otherwise noted in Hardware Sets, provide wall type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
 - 4. All Floor Stops shall be installed within four (4) inches maximum from the face of wall, bollard or partition.
 - 5. Overhead stops shall be made of stainless steel and non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.
- K. Hardware for interior sliding doors:
- 1. Operating hardware for pocket doors:
 - a. Provide manufacturer's complete set consisting of extruded aluminum or galvanized steel overhead track, adjustable hangers (carriages), galvanized steel split-jambs and split-studs, wood nailers for head track, jambs and studs, galvanized steel brackets for assembly and attachment to floor and wall framing, bumpers, and nylon floor guides designed to accommodate the number (single or biparting), size, thickness, and weight of door leaves indicated.
 - b. Provide flush pull and edge pull for each door leaf.
- L. Seals:
- 1. Provide continuous weatherstripping on exterior doors and smoke, light, or sound seals on interior doors where indicated or scheduled.
 - a. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

- b. Provide silicone gasket at all rated and exterior doors, in accordance with ASTM E 283 "Test method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen."
 - 2. Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.
 - 3. Provide silencers for hollow metal frames, 3 for single doors, 2 for pairs of doors.
 - a. Omit where sound or light seals occurs, or for fire-resistive-rated door assemblies.
- M. Thresholds:
- 1. Provide standard metal threshold unit of type, size, and profile as shown or scheduled.
 - 2. Exterior Doors: Provide units not less than 4 inches wide, formed to accommodate change in floor elevation, fabricated to accommodate door hardware and to fit door frames.
- N. Door Shoes & Door Top Caps: Provide galvanized door shoes at all exterior wood doors and galvanized top caps at all exterior out-swing doors.
- O. Fasteners:
- 1. Screws for strikes, face plates and similar items shall be flat head, countersunk type, provide machine screws for metal and standard wood screws for wood.
 - 2. Screws for butt hinges shall be flathead, countersunk, full-thread type.
 - 3. Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.
 - 4. Provide expansion anchors for attaching hardware items to concrete or masonry.
 - 5. All exposed fasteners shall have a phillips head.
 - 6. Finish of exposed screws to match surface finish of hardware or other adjacent work.
 - 7. All Exit Devices and Lock Protectors shall be fastened to the door by the means of sex bolts or through bolts.

2.4 FINISHES

- A. Hardware finishes:
- 1. General:
 - a. All hardware shall be satin chromium (US26D – 626) unless otherwise noted.
 - b. Provide push plates, pull plates and kick or armor plates in satin stainless steel (US32D – 630) unless otherwise noted.
 - c. Door closers shall be powder-coated to match other hardware, unless otherwise noted.
 - d. Aluminum items shall be finished anodized aluminum (US28 – 628), except thresholds which can be furnished as standard mill finish.
 - 2. Match items to the manufacturer's standard color and texture finish for the latch and lock sets (or push-pull units if no latch or lock sets).
 - 3. Provide finishes that match those established by BHMA or, if none established, match Architect's sample.
 - 4. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
 - 5. Provide protective lacquer coating on all exposed hardware finishes of brass, bronze, and aluminum, except as otherwise indicated. The suffix "-NL" is used with standard finish designations to indicate "no lacquer."

6. The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes," including coordination with the traditional U.S. Finishes shown by certain manufacturers for their products.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
 1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
 - a. Verify that doors and frames are square and plumb and ready to receive work and dimensions are as instructed in writing by the manufacturer.
 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Coordination:
 1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
 - a. Coordinate electrical power needs for those hardware items requiring electrical interface.
 - b. Coordinate electrical alarm needs (security, fire/smoke detection) for those hardware items requiring electrical alarm interface.
 2. Provide all required hardware templates.
- B. Surface preparation:
 1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
 2. Coordinate the blocking required for all wall mounted hardware.
 3. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

- A. General:
 1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
 - a. Hardware distributor shall assist and advise installer in correcting field problems arising during installation of hardware.
 - b. Hardware distributor shall be on the Project within 48 hours upon being notified by the Contractor.
 - c. Hardware distributor shall assist installer in the proper adjustment of all door closers, and other operating devices.

2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by the Architect.
 - a. Steel Doors and Frames: "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
 - b. Door opening devices shall be installed at 34" minimum to 44" AFF maximum height per CBC Section 11B-404.2.7.
5. Install each hardware item in compliance with the manufacturer's written instructions and recommendations. Where indicated and where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 09 Sections.
 - a. Do not install surface-mounted items until finishes have been completed on the substrate involved.
6. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
7. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
8. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Specification Section - SEALANTS.
9. Weatherstripping and seals shall comply with manufacturer's written instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.4 FIELD QUALITY CONTROL

- A. Inspection:
1. Contractor shall inspect all hardware to assure that it was installed correctly and is in proper working order.
 2. The Contractor shall schedule an inspection prior to substantial completion, and notify the Owner's Inspector and any regulatory agencies of the time 48 hours prior to the inspection.
 - a. The inspection shall cover checking all locks and verifying that they have been installed in accordance with the hardware schedule and the keying schedule.

3.5 ADJUSTING

- A. Adjusting:
1. Adjust and check each operating item of hardware and each door to ensure proper operations or function of every unit.
 - a. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
 - 1) Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area.
 - 2) Clean operating items as necessary to restore proper function and finish of hardware and doors.

- 3) Adjust door control devices to compensate for final operation of heating and ventilating equipment.

3.6 CLEANING

- A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
 1. Clean any soiled surfaces immediately.
 2. Finish shall be clean and ready for the application of any additional finishes.

3.7 DEMONSTRATION

- A. In accordance with Specification Section - PROJECT CLOSEOUT.
 1. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train Owner's maintenance personnel as specified below.
 - a. Provide the services of a factory-authorized service representative to demonstrate and train Owner's maintenance personnel as specified below.
 - 1) Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.

END OF SECTION

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SECTION 08 70 00.01 - HARDWARE SCHEDULE

1.1 SCHEDULES

- A. The items listed in the following schedule shall conform to the requirements of the foregoing specifications.
- B. The Door Schedule on the Drawings indicates which hardware set is used with each door.

Manufacturers Abbreviations (Mfr.)

GLY	=	Glynn-Johnson Corporation	Overhead Door Stops
IVE	=	Ives	Hinges, Pivots, Bolts, Coordinators, Dust Proof Strikes, Push Pull & Kick Plates, Door Stops
&			Silencers
LOC	=	Locinox	Gate closers
NGP	=	National Guard Products	Thresholds, Gasketing & Weather-stripping
LCN	=	Lewis C Norton	Door closers
PEM	=	Pemko	Thresholds, Gasketing & Weather-stripping
SCE	=	Schlage Electronics	Electronic Door Components
SCH	=	Schlage Lock Company	Locks, Latches & Cylinders; Accessible Levers: Schlage Sparta Levers.
TRI	=	Trimco	ADA Pocket Door Pulls & Flush Pulls
VON	=	Von Duprin	Exit Devices
ZER	=	Zero	Gasketing & Weather-stripping

HARDWARE GROUP NO. 75E - CLASSROOM SECURITY LOCK FUNCTION

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	CLASSROOM SECURITY	ND75TD SPA XN12-035	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	LOCK GUARD	LG12	630	IVE
1	EA	SURFACE CLOSER	4040XP OUTSWING	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP / HOLDER	1261/67 & 1268CK	626	
1	EA	GASKETING	188S-BK	S-BK	ZER
1	EA	DOOR BOTTOM	222APK	AL	PEM
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)		

HARDWARE GROUP NO. 80 - STOREROOM LOCK - INTERIOR STORAGE, TECHNOLOGY IDF, EQUIPMENT, JANITOR

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80TD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	1214CK & 1268CK	626	TRI
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE**TULARE JUSD****HARDWARE GROUP NO. 80E - STOREROOM LOCK - EXTERIOR ELEVATOR, EQUIPMENT**

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	STOREROOM LOCK	ND80TD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	LOCK GUARD	LG12	630	IVE
1	EA	SURFACE CLOSER	4040XP OUTSWING	689	LCN
1	EA	FLOOR STOP / HOLDER	1261/67 & 1268CK	626	
1	EA	GASKETING	188S-BK	S-BK	ZER
1	EA	DOOR BOTTOM	222APK	AL	PEM
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)		

HARDWARE GROUP NO. 802 - STOREROOM LOCK - INTERIOR PAIR, NO CLOSURE

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
1	SET	AUTO FLUSH BOLT	FB41P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
2	EA	FLOOR STOP / HOLDER	1261/67 & 1268CK	626	
2	EA	SILENCER	SR64	GRY	IVE
1	EA	MEETING STILE	328AA	AA	ZER

HARDWARE GROUP NO. 802E - STOREROOM LOCK - EXTERIOR PAIR / MECHANICAL CLOSET

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	224HD	628	IVE
1	SET	AUTO FLUSH BOLT	FB41P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	LOCK GUARD	LG12	630	IVE
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	SURFACE CLOSER	4040XP OUTSWING	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
2	EA	FLOOR STOP / HOLDER	1261/67 & 1268CK	626	

HARDWARE GROUP NO. 85E - FACULTY RESTROOM LOCK

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	FAC RESTRM W/IND CYL	ND85PD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	DEADBOLT	B571 WITH IN- USE INDICATOR	626	SCH
1	EA	LOCK GUARD	LG12	630	IVE
1	EA	SURFACE CLOSER	4040XP OUTSWING	689	LCN
1	EA	FLOOR STOP / HOLDER	1261/67 & 1268CK	626	
1	EA	GASKETING	188S-BK	S-BK	ZER
1	EA	DOOR BOTTOM	222APK	AL	PEM
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)		
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

INTERIOR AND EXTERIOR PANIC HARDWARE

PANIC HARDWARE GROUP LEGEND

- # = INTERIOR SINGLE DOOR WITH NO CLOSER
- 99 = VON DUPRIN 98/99 SERIES EXIT DEVICE
- #2 = PAIR OF DOORS WITH CLOSERS
- #A = DOOR WITH ACOUSTICAL GASKETS
- #AO = DOOR WITH LOW ENERGY AUTO OPENER
- #C = INTERIOR DOOR, WITH **CLOSER** & HOLD OPEN
- #E = **EXTERIOR** DOOR WITH CLOSER & HOLD OPEN
- #EL = **ELECTRONIC LOCK**
- #EO = **EXIT ONLY**
- #HO = **ELECTRO-MAGNETIC DOOR STOPS**
- #R = INTERIOR RATED DOOR WITH CLOSER
- #S = INTERIOR STOREFRONT DOOR
- #TR = TEMPERATURE RISE FIRE-RATED

Classroom Security Function "-2SI" to be used at all Fire Rated INTERIOR Classroom Doors

98/99 Rim exit device



-2SI
Security Indicator

HARDWARE

TULARE JUSD

HARDWARE GROUP NO. 99E - EXTERIOR DOOR WITH PANIC HARDWARE :

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	PANIC HARDWARE	CD-AX-99-NL-OP-110MD-PA	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	SURFACE CLOSER	4040XP OUTSWING	689	LCN
1	EA	FLOOR STOP / HOLDER	1261/67 & 1268CK	626	
1	SET	WEATHER SEAL	SUPPLY WITH DOOR AND FRAME ASSEMBLY		
1	EA	THRESHOLD	196A-228A-195A (SEE DETAILS)		
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	188S-BK	S-BK	ZER
1	EA	DOOR BOTTOM	222APK	AL	PEM

EXTERIOR SITE DOORS AND GATES

HARDWARE GROUP NO. 232G - PADLOCK - PAIR SITE GATES

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	PADLOCK KNK-KD	KS23F2300	606	SCH
2	EA	FSIC CORE	23-030	626	SCH

HARDWARE GROUP NO. 98G - SINGLE SITE GATE - HOLLOW METAL DOOR WITH PANIC HARDWARE

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	224HD	628	IVE
1	EA	PANIC HARDWARE	CD-AX-98-NL-OP-110MD-PA	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP / HOLDER	1261/67 & 1268CK	626	
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 9820M

EXTERIOR ORNAMENTAL METAL POOL GATE WITH PANIC HARDWARE W/ LEVER PULLS

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	HINGE CLOSER	LOXINOX MAMOTH 180	SILVER	LOX
1	EA	KEYED REMOVABLE MULLION	KR4954-154STAB -MT54 HOT-DIPPED GALVANIZED AFTER FABRICATION	689	VON
1	EA	RIM CYLINDER	20-057-ICX (MULLION)	626	SCH
1	EA	FSIC MORT. CYL.	20-700 114 (MULLION)	626	SCH
2	EA	PANIC HARDWARE	CD-AX-98-L-996L-06	626	VON
2	EA	RIM CYLINDER	20-057-ICX	626	SCH
2	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH
5	EA	FSIC CORE	23-030	626	SCH

END OF SECTION

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SECTION 092216 – METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install all metal framing materials (both Cold-Formed Framing and Lightgage Metal Framing), accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 03 15 14 DRILLED ANCHORS
 4. 03 30 00 CAST-IN-PLACE CONCRETE
 5. 04 22 00 CONCRETE MASONRY UNITS
 6. 05 12 00 STEEL AND FABRICATIONS
 7. 05 30 00 METAL DECK
 8. 06 10 00 ROUGH CARPENTRY
 9. 06 41 23 MODULAR CASEWORK
 10. 07 21 00 INSULATION
 11. 07 51 13.01 BUILT-UP ROOFING
 12. 07 53 29 ELASTOMERIC MEMBRANE ROOFING
 13. 07 60 00 SHEET METAL
 14. 07 72 00 ROOF ACCESSORIES
 15. 07 92 00 SEALANTS
 16. 08 16 13 FIBERGLASS DOORS AND FRAMES
 17. 09 29 00 GYPSUM BOARD
 18. 10 05 00 MISCELLANEOUS SPECIALTIES
 19. 10 14 00 IDENTIFYING DEVICES
 20. 10 21 13 TOILET PARTITIONS
 21. 10 44 00 FIRE PROTECTION SPECIALTIES
 22. 11 66 43 SCOREBOARDS
 23. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

- A. In accordance with the following:
1. AISI American Iron and Steel Institute
 2. ASTM American Society for Testing Materials
 3. AWS American Welding Society
 4. ICC International Code Council.

1.3 DEFINITIONS

- A. Minimum Uncoated Steel Thickness: Minimum uncoated thickness of metal framing delivered to the Project site shall be not less than 95 percent of the thickness used in the metal framing design. Lesser thicknesses shall be permitted at bends due to cold forming.

1.4 SYSTEM DESCRIPTION

- A. Performance Requirements: It is the intention of this section and the drawings to form a guide for a complete framing system. Any items not specifically noted but necessary for a complete framing system shall be provided under this section.
 - 1. Wall systems shall accommodate tolerances, deflection of building structural members, and clearances of intended openings.
 - 2. Fire-Test-Response Characteristics: Where indicated, provide metal framing materials and construction identical to that of assemblies tested for fire resistance.
 - a. Per ASTM E 119 "Test methods for Fire Tests of Building Construction and Materials" by a testing and inspecting agency acceptable to Authorities Having Jurisdiction (AHJ), products used in the assembly shall carry a classification label from a testing laboratory acceptable to the AHJ.

1.5 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 - 1. Product Data: For each type of product indicated.
 - a. Materials list of items proposed to be provided under this section.
 - 2. Quality Assurance/Control Submittals:
 - a. Test Reports:
 - 1) Current ICC ES Report.
 - 2) Welding inspection report per DSA/SSS "T & I" List.
 - b. Certificates:
 - 1) Welding certificates indicating qualifications.
 - 2) Mill certificates, per ICC AC46 "Acceptance Criteria for Cold-Formed Steel Framing Members", indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, and metallic-coating thickness. Comply also with CBC Section 2203A.1.
 - c. Manufacturer's Written Instructions:
 - 1) Manufacturer's written recommended installation procedures shall become the basis for accepting or rejecting actual installation procedures on the work.
 - 3. Closeout Submittals in accordance with the following:
 - a. Warranty in accordance with Specification Section –WARRANTIES.

1.6 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Material Qualifications:

- a. Galvanized and carbon sheet steel products formed from steel with a minimum yield stress of 33 ksi for 18 gage and lighter member and 50 ksi for 16 gage and heavier members.
 - b. All products shall be engineered to meet the latest Edition of the American Iron and Steel Institute (AISI), "North American Specification for the Design of Metal Steel Structural Members".
 - c. All products manufactured shall comply with the CBC and AISI, and shall have a current ICC Evaluation Service Report (ICC ESR).
 - 1) AISI "Code of Standard Practice for Cold-Formed Steel Structural Framing".
2. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - b. Welders shall be qualified for welding in horizontal, vertical, and overhead positions in accordance with AWS D1.3.
 3. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
- B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
- C. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintaining installed work until the Notice of Substantial Completion has been executed.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. General: Steel Framing and related accessories shall be stored and handled in accordance with AISI "Code of Standard Practice for Cold-Formed Steel Structural Members".
- B. Packing, shipping, handling, and unloading:
1. Products shall be handled in such a manner as to assure that they are free from corrosion, deformation, dents, scratches and other damage.

- C. Acceptance at Site:
 - 1. Products must be in manufacturer's original unopened bundles and containers with labels indicating brand name, size, and grade.
 - 2. Damaged products will not be accepted.

- D. Storage and protection:
 - 1. Metal Framing and related accessories shall be stored and handled in accordance with the AISI "Code of Standard Practice".
 - 2. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.8 PROJECT CONDITIONS

- A. Existing Conditions:
 - 1. Examine project and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
 - 2. Field Measurements: Take and be responsible for field measurements as required. Report any significant differences between field dimensions and the contract document conditions to Architect.
 - 3. Carefully coordinate work under this Section with that of the structural framing sections and details so that the interface between structural framing and non structural framing shall provide the lines and degree of finish shown and specified.

1.9 Describe special or extended warranty or bonds covering the conformance and performance of the work of the section. Coordinate with Contracting Requirements. Do not make statements that will limit or void those provisions. Ensure that procedures complement Division 01 Closeout Submittals. Include statements specific to this section that supplement or extend warranties contained in Div 01 Warranties WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section - WARRANTIES.

- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.

- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. The products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
1. Studs, Tracks, Ceiling Joists, Channels and Steel Accessories specified product manufacturer:
 - a. CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).
 - b. Acceptable alternative manufacturers:
 - 1) CEMCO.
 - 2) STUDCO.
 2. Slotted Deflection Track and Vertical Deflection Clip accessories specified product manufacturer, unless otherwise noted:
 - a. BRADY INNOVATIONS "SLP-TRK" Slotted Deflection Track.
 - b. CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).
 - 1) Vertical Deflection Clips:
 - a) "Fast Top Clips"
 - b) "Fast Clip Slide Clips"
 - c) "Quick Clip"
 - d) "Slide Clip"
 - c. Acceptable alternative manufacturers:
 - 1) CEMCO.
 - 2) STUDCO.
 3. Shaftwall specified product manufacturer:
 - a. CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).
 - b. Acceptable alternative manufacturers:
 - 1) CEMCO.
 - 2) STUDCO.
 4. Flat Strap and Backing Plate:
 - a. CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS):
 - 1) "DanBack" Fire Treated Wood Backing Plate.
 - b. Acceptable alternative manufacturers:
 - 1) CEMCO.
 - 2) STUDCO.
 5. Channel Bridging or Bracing:
 - a. CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS):
 - 1) "Spazzer 9200" Bridging and Spacer bar.
 - 2) "EasyClip" and "U-Series" Clip Angle.
 - b. Acceptable alternative manufacturers:
 - 1) CEMCO.
 - 2) STUDCO.
 6. Metal screw specified product manufacturer:

a. GRABBER CONSTRUCTION PRODUCTS.

- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Steel Sheet:

1. Steel sheet for 16 gage and heavier shall comply with ASTM A 1003 "Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members," structural steel classification, Grade 50 ksi, Class 1 or 2.
2. Steel sheet for 18 gage and lighter shall comply with ASTM A 1003 "Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members," structural steel classification, Grade 33 ksi, Class 1 or 2.
3. When hot-rolled steel sheet and strip is used in fabrication of metal members they shall comply with ASTM A1011 "Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength," structural steel classification, Grade 50 ksi.

B. Coating:

1. Steel sheet shall be galvanized in accordance with ASTM A 1003 "Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members," G60 minimum and comply with ASTM A 924 "Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process."
 - a. Vertical Deflection Clips shall be in accordance with ASTM A 1003 "Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members," G90 minimum and ASTM A 924 "Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process."
2. When hot-rolled steel sheet and strip is used in fabrication of metal members, hot-dip galvanize coating shall be in accordance with ASTM A 123 "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products."

C. Thickness:

REFERENCE GAGE	MILS	MINIMUM BASE METAL THICKNESS (INCH)	MINIMUM DESIGN THICKNESS (INCH)
20	33	0.0329	0.0346
18	43	0.0428	0.0451
16	54	0.0538	0.0566
14	68	0.0677	0.0713
12	97	0.0966	0.1017
10	118	0.1180	0.1240

2.3 COMPONENTS

- A. Studs: Manufacturer's standard C-shaped steel studs, punched, with stiffened flanges, complying with ASTM C 645 "Specification for Nonstructural Steel Framing Members."
- B. Track: Manufacturer's standard U-shaped steel track, unpunched, with unstiffened flanges, complying with ASTM C 645 "Specification for Nonstructural Steel Framing Members."

1. Slotted Deflection Track: Manufacturer's single, 20 gage minimum, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges with vertical slotted holes, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads.
 - a. Product, or approved equivalent, must be approved by DSA/SSS.
 - b. Slotted Deflection Track must be rated for both 1 and 2 hour "T" and "F" Fire-Rated Assemblies.
 2. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
 - a. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal and lateral loads.
- C. Vertical Deflection Clips: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure.
- D. Ceiling Joists: Manufacturer's standard C-Shaped steel sections, with stiffened flanges, complying with ASTM C 645 "Specification for Nonstructural Steel Framing Members."
- E. Channels: In sizes as shown in the Contract Documents:
 1. 16 gage, 3/4 inch with 1/2 inch flange 300 lbs/1000 feet weight.
 2. 16 gage, 1-1/2 inch with 17/32 inch flange 500 lbs/1000 feet weight.
 3. 16 gage, 2 inch with 17/32 inch flange 590 lbs/1000 feet weight.
- F. Shaftwall: Manufacturer's standard shapes for fire-rated assemblies and complying with ASTM C 645 "Specification for Nonstructural Steel Framing Members." Shapes shall be 20 gage minimum, unless noted otherwise.
 1. Track: Manufacturer's standard J-Runner Shaped Track (JR), tabbed, with un-stiffened flanges.
 2. Studs: Manufacturer's standard C-H (CH), E-S (ES), I-S (IS) Shaftwall Studs, punched with stiffened flanges.
 3. Jamb Strut: Manufacturer's standard corner and Jamb Strut (JS), un-punched, with un-stiffened flanges.
- G. Flat Strap and Backing Plate: Galvanized Steel Sheet for blocking and bracing in length and width required.
 1. Standard Backing shall be 16 gage minimum and continuous. Notch backing at studs.
- H. Channel Bridging or Bracing:
 1. U-Channel Assembly per ASTM C 645 "Specification for Nonstructural Steel Framing Members," Base Metal Thickness of 0.0538 inch and minimum 1/2 inch wide flanges.
- I. Steel Accessories: Fabricate Backing, Bridging, Clip Angles, Strap and Shapes in configurations shown and in compliance with ASTM C 645 "Specification for Nonstructural Steel Framing Members."
 1. Standard Backing shall be 16 gage minimum and continuous. Notch backing at studs.

2.4 ACCESSORIES

- A. Fasteners:

1. Metal Screws: Provide corrosion-resistant-coated, self-drilling or self-tapping steel screws complying with ASTM C 1513 "Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections" and ICC ESR 2196 "HILTI Self-Drilling and Self-Piercing Screws."
 - a. Provide low profile "Truss Head" framing screws so that subsequent substrates lay flat over fasteners.
 2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 "Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members" conducted by a qualified independent testing agency.
 3. Expansion Anchors: Refer to Specification Section – DRILLED ANCHORS.
- B. Welding Electrodes: Comply with AWS Standards.
- C. Galvanized Repair Paint: Provide product complying with ASTM A 780 "Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings."
- D. Drypack Grout: Refer to Specification Section – CAST-IN-PLACE CONCRETE.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
 2. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
 3. Carefully coordinate all requirements for pipes and other items designed to be housed within the partition, wall or ceiling systems.
 4. Carefully coordinate all requirements for backing support of items to be mounted on finished walls.
 5. Space metal framing as required for compliance with all pertinent regulations, to give proper support for the facing material, and as indicated on the Drawings.

3.2 PREPARATION

- A. Protection:
1. Protect all adjacent surfaces from damage from work under this specification section.
 2. Remove any fireproofing only as much of these materials as needed to complete installation of metal framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.
- B. Surface preparation:

1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
3. Grout bearing surfaces uniform and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction.

3.3 INSTALLATION

A. General:

1. In accordance with drawings and manufacturer's written instructions and recommendations, and procedures described in ASTM C 754 "Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products."
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.
5. Metal Framing may be shop or field fabricated for installation, or it may be field assembled.

B. Layout:

1. Lines shall be straight and true.
2. Install Metal Framing according to ASTM C 754 "Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products," unless more stringent requirements are indicated.

C. Installation:

1. Install shop or field fabricated, Metal Framing and securely anchor to supporting structure.
 - a. Bolt or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch in ten (10) feet.
2. Install Metal Framing and accessories plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations and requirements of the Contract Documents.
 - a. Cut framing members by sawing or shearing; do not torch cut.
 - b. Fasten Metal Framing members by welding or screw fastening. Wire tying of framing members is not permitted.
 - 1) Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - 2) Locate mechanical fasteners and install, with screw penetrating joined members by not less than three exposed screw threads.
 - 3) Beneath sheathing provide low-profile screw heads (i.e. "Wafer Head").
 - 4) Fasten both flanges of studs to track, unless otherwise indicated.
3. Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members.
4. Punched openings in studs must align when placed in final position.

5. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
6. Install horizontal bridging in wall studs, spaced in rows as indicated on the drawings. Fasten at each stud intersection.
7. Do not bridge building expansion and control joints with Metal Framing. Independently frame both sides of joints.
8. Install insulation in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
9. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
10. Erection Tolerances: Install Metal Framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - a. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
11. At all sound partitions, set floor runners in two 1/4 inch diameter continuous beads of acoustical sealant as prescribed in Specification Section - SEALANTS.
12. At all smoke barrier partitions, set floor and ceiling runners in two 1/4 inch diameter continuous beads of Class II Flame Spread and Smoke Developed rated acoustical sealant as prescribed in Specification Section - SEALANTS.
13. Install supplementary backing and bracing wherever walls or partitions are indicated to support equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to wall or partition. Comply with stud manufacturer's written instructions and industry standards.
14. Frame wall openings larger than 2-foot square with double stud at each jamb.
15. Install continuous strapping to side of studs that do not receive sheathing at 3'-6" o.c. vertically.

D. Ceiling Joist Installation:

1. Align and install joist track and ceiling joists plumb, square, and true to line bearing on supporting frame. Securely fasten connections according to manufacturer's written recommendations and requirements of the Contract Documents.
2. Install bridging at interval indicated on the drawings. Fasten at each joist intersection.

3.4 REPAIR / RESTORATION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed Metal Framing with galvanized repair paint and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, that ensure Metal Framing is without damage or deterioration at time of Substantial Completion.

3.5 FIELD QUALITY CONTROL

- A. Site Tests:
 1. As required by Regulatory Requirements.

- B. Inspection:
1. As required by Regulatory Requirements.
 2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
 3. Project Inspector shall verify that all stud cavity walls are free of moisture and dry prior to any other construction that encloses the wall cavity.

END OF SECTION

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SECTION 092400 – CEMENT PLASTER

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install all Cement Plaster materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 2. The Exterior Wall finishes and the water resistant barrier (WRB) shall comply with CBC Code Section 1402.5, 2603.5.5 and NFPA 285. The Rigid Insulation shall have a flame spread index no greater than 25 as determined by ASTM E84 or UL 723
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS
 2. ALL DIVISION 01 SPECIFICATION SECTIONS
 3. 03 30 00 CAST-IN-PLACE CONCRETE
 4. 04 21 00 THIN BRICK VENEER
 5. 04 22 00 CONCRETE MASONRY UNITS
 6. 06 10 00 ROUGH CARPENTRY
 7. 05 12 00 STEEL AND FABRICATIONS
 8. 05 33 00 METAL DECK
 9. 07 21 00 INSULATION
 10. 07 60 00 SHEET METAL
 11. 07 84 00 FIRESTOPPING
 12. 07 92 00 SEALANTS
 13. 07 95 00 EXPANSION JOINTS
 14. 08 11 00 METAL DOORS AND FRAMES
 15. 08 31 13 ACCESS DOORS AND FRAMES
 16. 08 33 00 COILING DOORS
 17. 08 41 00 STOREFRONTS
 18. 08 41 23 STOREFRONT TEMPERATURE RISE
 19. 08 91 00 LOUVERS
 20. 09 22 16 METAL FRAMING
 21. 09 30 00 TILE
 22. 09 50 00 ACOUSTICAL CEILINGS
 23. 09 65 10 RESILIENT BASE AND ACCESSORIES
 24. 09 91 00 PAINTING
 25. 10 05 00 MISCELLANEOUS SPECIALTIES
 26. 10 14 00 IDENTIFYING DEVICES
 27. 10 21 13 TOILET PARTITIONS
 28. 10 26 00 WALL AND CORNER GUARDS
 29. 10 28 13 TOILET ACCESSORIES
 30. 10 44 00 FIRE PROTECTION SPECIALTIES
 31. 10 51 13 METAL LOCKERS
 32. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:

1. In accordance with the following standards:
 - a. AAMA American Architectural Manufacturers Association
 - b. ASTM American Society of Testing Materials
 - c. FS Federal Specification
 - d. ML/SFA Metal Lath / Steel Framing Association - a Division of NAAMM.
 - e. NAAMM National Association of Architectural Metal Manufacturers.
 - f. PDSM Plaster and Drywall Systems Manual, ©1988 by BNI and McGraw-Hill, Inc., Third Edition.
 - g. SSMA Steel Stud Manufacturer's Association.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

1. Product Data:
 - a. Manufacturer's Data for each type of product specified.
 - b. Submit manufacturer's standard color range for selection by the Architect.
 - c. Manufacturer's full color range (including any standard, premium and custom colors) of integral color plaster mixes and Elastomeric Finish Coats for selection.
 - d. Manufacturer's ICC ES Evaluation Reports (ESR) for fasteners as required.
2. Shop Drawings:
 - a. Show location of all metal accessories: expansion joints, control joints, casing beads, corner reinforcements, separation screeds and reglets.
 - b. Provide installation details of flashings at various types of penetrations, all metal accessories, metal lath, and integration with other related work.
3. Samples:
 - a. 24 inch square field sample of each Cement Plaster Finish prepared on rigid backing for selection.
 - 1) Cement Plaster Finish of each pattern and texture selected prior to paint coat.
 - 2) Cement Plaster Finish of each pattern and texture for each color with type of paint coating selected. Coordinate with Specification Section – PAINTING.
 - b. 6 inch lineal samples of each piece of specified Metal Accessory material as required for the project.
4. Quality Assurance/Control:
 - a. Installer's experience.
 - b. Manufacturer's certification of Installers.
 - c. Manufacturer's installation instructions.
 - d. Water Tightness Test Reports.
 - e. Manufacturer's Field Reports:
 - 1) Confirm mixing and installation procedures of proprietary mixes for all coats of the cement plaster system were within manufacturers requirements.
 - f. Tension Testing Reports.
5. Closeout Submittals in accordance with the following:
 - a. In accordance with Specification Section - PROJECT CLOSEOUT.

- b. Warranty in accordance with Specification Section – WARRANTIES.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Material Qualifications:
 - a. Proprietary systems data sheets shall include design properties of each product.
 - 2. Installer Qualifications:
 - a. Installer shall be experienced and shall have successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - b. Shall participate in a mock-up installation that was successfully tested for water tightness.
 - c. Manufacturer of proprietary products shall provide written certification that the Installer is qualified to install manufacturer's systems in accordance with manufacturer's warranty requirements.
 - 3. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
- B. Regulatory Requirements:
 - 1. In accordance with Specification Section – REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
- C. Field Samples:
 - 1. Provide Field Samples for approval prior to the application of the cement plaster coats.
 - 2. Field Samples shall be panels of a complete installation, representing each of the finish textures and colors from the approved submittal samples.
 - a. The field samples shall be done by the installers for the project.
 - b. The approved field samples shall establish the acceptable standards for all subsequent work.
 - 3. When it is the Contractor's intent to incorporate the approved sample panels into the finish Project, the panels shall be located in an area relatively obscured from general view.
- D. Mock-Ups:
 - 1. Provide mock-up panels prior to application of cement plaster work and prior to installation of any exterior wall cavity and interior materials.
 - 2. Mock-Up Assemblies:
 - a. Mock-Ups shall be at exterior wall assemblies and shall integrate all other related work assemblies, including but not limited to, each type of wall openings, wall/eave interface, wall sill, parapet cap, various types of penetrations, material transitions and shall be representative of the intended end-use configuration.
 - 1) Mock-Ups shall be a minimum overall size of 10'-0" wide x 8'-0" high.
 - b. Mock Ups will be used for establishing construction sequence, installation requirements of materials, and creating water tight assemblies without the cement plaster coats.

- c. Mock Ups may become part of the completed Work upon successful testing for water tightness.
- 3. Installation:
 - a. The Project Inspector, the Architect, Contractor's Superintendent and Sub-contactor's Superintendent shall observe the installation of materials.
 - b. Installation crew for the Mock-Ups shall be the installers of the Cement Plaster Systems for this project and installers, as necessary, of other related work assemblies.
 - c. Mock Ups shall include the installation of water barriers, penetration flashing, Metal Accessories, Metal Lath, and other related work flashings and materials.
 - d. Failed Mock Ups shall be removed and the assembly reinstalled until the water tightness test is successful.

E. Meetings:

- 1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with all other related work.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
- 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:

- 1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:

- 1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
- 2. Damaged products will not be accepted.

C. Storage and protection:

- 1. Store materials inside and under cover on a level platform, six (6) inches above ground, to allow air circulation.
 - a. Keep dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other causes.

1.6 PROJECT CONDITIONS

A. Environmental requirements:

- 1. Temperature: No plastering shall be done under unsuitable conditions of weather or temperature.

- a. Exterior: No plastering shall be done when prevailing temperature is 40 degrees F. or less for the preceding 24 hours prior to plastering, during the plaster operations, and for at least 48 hours after the set of each plaster coat.
 - 1) Apply and cure plaster to prevent plaster drying out during the curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
 - b. Factory-Prepared Finishes: Comply with manufacturers written recommendations for the environmental conditions for application of finishes.
- B. Existing Conditions:
- 1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.7 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Water Barriers:
 - a. Building Wrap (also qualifies as an "Air Barrier"):
 - 1) DuPONT COMPANY.
 - 2) TYPAR.
 - b. Sealing Tape:
 - 1) DuPONT COMPANY.
 - 2) Acceptable alternative manufacturers:
 - a) CANTECH INDUSTRIES.

- b) 3M COMPANY.
 - c) TYPAR.
 - c. Building Paper:
 - 1) FORTIFIBER CORP.
- 2. Ice and Water Shield:
 - a. GRACE CONSTRUCTION PRODUCTS “Ice and Water Shield”.
 - b. Acceptable alternative manufacturers:
 - 1) CARLISLE COATINGS & WATERPROOFING “Dri-Start A”
- 3. Penetration Flashing:
 - a. GRACE CONSTRUCTION PRODUCTS.
 - b. Acceptable alternative manufacturers:
 - 1) FORTIFIBER.
- 4. Expanded Metal Lath:
 - a. CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).
 - b. Acceptable alternative manufacturers:
 - 1) ALABAMA METAL INDUSTRIES CORPORATION (AMICO).
 - 2) CEMCO.
- 5. Wire Fabric Lath :
 - a. Woven Wire Fabric Lath:
 - 1) GEORGETOWN WIRE COMPANY
 - 2) Acceptable alternative manufacturers:
 - a) DAVIS WIRE COMPANY.
 - b) JAENSON WIRE COMPANY.
 - b. Welded Wire Fabric Lath:
 - 1) STRUCTA WIRE COMPANY, INC.
- 6. Fiber Reinforced Cement Plaster with Embedded Mesh Reinforcing Coat, and Acrylic-Enhanced Cementitious Finish System:
 - a. OMEGA
 - 1) Scratch/Brown: "Super Cement" Fiber reinforced.
 - 2) Reinforcing Mesh: "Crack Isolation System".
 - a) Base Coat, Styro-Glue DryBond
 - b) Mesh, AkroFlesh Standard Mesh
 - 3) Primer/base coat:
 - a) RapidPrime as manufactured by OMEGA PRODUCTS INTERNATIONAL, INT.
 - 4) Finish Coat:
 - a) Cementitious Finish Coat, Colortek Paint Grade Exterior Stucco 30/30.
 - b) Cementitious Finish Coat, acrylic admix: "AcroLoc".
 - b. Acceptable alternative system manufacturers:
 - 1) BASF WALL SYSTEMS
 - 2) PAREX
- 7. Metal Accessories:
 - a. Galvanized Metal Plaster Accessories:
 - 1) CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).
 - 2) STOCKTON PRODUCTS (SP).
 - 3) Acceptable alternative manufacturers:
 - a) ALABAMA METAL INDUSTRIES CORPORATION (AMICO).
 - b) CEMCO.
 - b. Aluminum Plaster Accessories:

- 1) FRY REGLET CORPORATION.
 - 2) Acceptable alternative manufacturers:
 - a) FLANNERY, INC.
 - b) PITTCO.
 - c. Fastener:
 - 1) FLANNERY, INC.
 8. Suspension System and Furring:
 - a. CEMCO.
 - b. Acceptable alternative manufacturers:
 - 1) ALABAMA METAL INDUSTRIES CORPORATION (AMICO).
 - 2) CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).
 - 3) UNIMAST, INC.
 9. Lath Fasteners:
 - a. Self-Sealing Furring Nails and Self-Sealing Furring Screws:
 - 1) FASTEN SEAL PRODUCTS, LLC.
 - b. Screw Anchors:
 - 1) POWERS FASTENERS "TAPPER +".
- B. Products from other manufacturers not listed must submit in accordance with Specification Section – SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Suspension System:
1. Main Runners:
 - a. Cold Hot-Rolled Channels: 17 gage (0.0538 inch), galvanized steel:
 - 1) 2-1/2 inch web x 1/2 inch flange, 597 lbs./1000 lineal feet weight minimum.
 2. Cross Furring:
 - a. Cold-Rolled Channel: 17 gage (0.0538 inch), galvanized steel.
 - 1) 1-1/2 inch x 1/2 inch flange, 414 lbs./1000 lineal feet weight minimum.
 3. Wire:
 - a. General:
 - 1) All wire shall be Class 1 zinc coated (galvanized), soft tempered wire in accordance with ASTM A 641 "Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire."
 - a) All wire shall also comply with FS-QQ-W-461H, and ASTM A 510, "Standard Specification for General Requirements for Wire Rods and Course Round Wire Carbon Steel."
 - 2) All wire diameters specified are uncoated and corresponds with United States Steel Wire Gauge (USSWG).
 - b. Hanger Wire: 8 gage (0.1620 inch).
 - c. Bracing (Splay)Wire: 12 gage (0.0475 inch)
 - d. Grid Tie Wire: 16 gage (0.0625 inch)
 4. Compression Struts (Metal angles, galvanized steel):
 - a. 1/8 inch thick x 1 inch x 1 inch 800 lbs./1000 lineal feet weight.
 - b. 3/16 inch thick x 1-1/4 inch x 1-1/4 inch 1,480 lbs./1000 lineal feet weight.
 - c. 3/16 inch thick x 1-1/2 inch x 1-1/2 inch 1,800 lbs./1000 lineal feet weight.
 - d. 3/16 inch thick x 1-3/4 inch x 1-3/4 inch 2,120 lbs./1000 lineal feet weight.
 - e. 3/16 inch thick x 2 inch x 2 inch 2,440 lbs./1000 lineal feet weight.
 - f. 3/16 inch thick x 2 inch x 2-1/2 inch 3,070 lbs./1000 lineal feet weight.

- g. 3/16 inch thick x 3 inch x 3 inch 3,710 lbs./1000 lineal feet weight.
- h. 1/4 inch thick x 3-1/2 inch x 3-1/2 inch 5,800 lbs./1000 lineal feet weight.
- i. 1/4 inch thick x 4 inch x 4 inch 6,600 lbs./1000 lineal feet weight.
- j. Alternate Compression Struts: Refer to drawings.
 - 1) Must be submitted to and approved by DSA.

B. Furring:

- 1. Cold Rolled Channels: 16 gage minimum galvanized steel.
 - a. 3/4 inch x 1/2 inch flange, 300 lbs./1000 lineal feet weight.
 - b. 1-1/2 inch x 17/32 inch flange, 500 lbs./1000 lineal feet weight.

C. Cement Plaster System:

- 1. Line Wire: Galvanized steel wire, in accordance with ASTM A 641 "Specification for Zinc-Coated (Galvanized) Carbon Steel Wire".
 - a. Minimum 18 gage (0.0475 inch).
- 2. Water Barriers: Water-Resistive Barriers shall be in accordance with CBC Sections 1404.2 and 2510.6:
 - a. Building Wrap (also qualifies as an "Air Barrier"): Woven and non-woven polyolefin sheets approved per ICC ES Reports for Water-Resistive Barriers for buildings of any construction type and equivalent to Grade D paper with 60 minute water-resistant rating.
 - 1) "Tyvek® Commercial Wrap" by DuPONT COMPANY.
 - b. Sealing Tape (3" wide minimum):
 - 1) "Tyvek® Housewrap Tape" by DUPONT COMPANY.
 - 2) Acceptable alternative manufacturer:
 - a) "Clipper Tape" by CANTECH IND.
 - b) "8086 Construction Sheathing Tape" by 3M.
 - c. Building Paper:
 - 1) Number 15 Asphalt-Saturated felt complying with Type I felt in accordance with ASTM D226 "Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing".
 - 2) Asphalt-Saturated Kraft Waterproof Building Paper approved per ICC ES Reports for Water-Resistive Barriers for buildings of any construction type and equivalent to Grade D paper with 60 minute water-resistant rating.
- 3. Penetration Flashing: Self-adhered and self-healing weather barrier strips, in accordance with FS UU-B-790a, Grade A.
 - a. 40 mil. minimum thickness, in 9-inch and 12-inch widths as is appropriate for barrier application.
 - 1) "VYCOR V40" by GRACE CONSTRUCTION PRODUCTS.
 - 2) Acceptable alternative manufacturer:
 - a) "Fort-I-Flash 40" by FORTIFIBER
 - b) "FlexWrap" and "StraightFlash" by TYVEK.
- 4. Metal Accessories: Zinc Alloy, Aluminum or Hot-Dipped Galvanized Steel, G-60 minimum (Coordinate depth of trim and accessories with the thicknesses and number of plaster coats).
 - a. Control Joints:
 - 1) 28 gage galvanized steel, depth as required, AMICO No. "GripLock J Control Joint".
 - b. Expansion Joint
 - 1) 26-Gauge galvanized steel.
 - 2) 2-piece expansion joint for up to 1" in vertical travel,

- 3) 10-foot lengths.
- 4) 3/4" Ground x 3/4" Reveal.
- c. Casing Bead:
 - 1) 26 gage galvanized steel, 1-1/2" x depth as required, CDBS No. 66, Short Flange Casing Bead.
- d. Corner Reinforcement:
 - 1) Outside Reinforcements:
 - a) 26 gage galvanized steel, depth as required, CDBS #1A, Expanded Flange.
 - 2) Inside Joints:
 - a) 28 gage galvanized steel, depth as required, CDBS #30 Construction Control Joint.
- e. Drip Mold:
 - 1) 24 gage galvanized steel, 2-3/4" x depth as required, SP BSS Blind Spot #10 Drip.
- f. Vents:
 - 1) 26 gage galvanized steel, 3" x depth as required, SP SBS Bug Stop Vent.
 - 2) 26 gage galvanized steel, 3" x depth as required, SP SES Ember Stop Soffit Vent.
- g. Foundation Sill Screed: 3-1/2 inch minimum vertical attachment flange per CBC Section 2512.1.2.
 - 1) 26 gage galvanized steel, 3-1/2" x depth as required, CDBS #FHA7 Foundation Sill Screed, with weep holes.
- h. Weep Screed:
 - 1) 26 gage galvanized steel, 1-1/2" x depth as required with weep holes, CDBS #66 Short Flange Casing Bead, with weep holes.
- i. Special Trim Shapes, minimum 0.025 extruded aluminum alloy 6063:
 - 1) Channel Screeds, Reveal Moldings, & Screeds by FRY REGLET:
 - a) Provide specific shapes as shown on the Drawings.
 - b) Provide manufacturer's standard channel screed "+", "T", "L", and "corners", factory fabricated intersections as required for channel screeds, reveal moldings and screeds.
 - c) Provide manufacturer's standard flashing connectors between straight runs and intersections.
 - d) Butt Joints shall be flush and align with other metal accessories.
 - e) Provide End Caps compatible for all channel screeds, reveal moldings, and screeds that terminate at opening frames and other construction.
 - f) All finishes shall be "Special Anodic Coating," clear color.
- j. Single Point Separation Screed:
 - 1) 26 gage galvanized steel, Expanded Metal Base x depth as required, SP PBS Pointed Base Screed with Keyholes.
- k. Stucco Reglet: 26 gage galvanized steel:
 - 1) 2-1/2-inch flange by FRY REGLET "STX" Series.
 - 2) 1-3/4 inch flange by FRY REGLET "ST" Series.
 - 3) Accessories: Factory manufactured mitered and sealed corners, and polyvinyl chloride "Vinylok" flashing retainer clips.
- 5. Metal Lath:
 - a. Expanded Metal Lath: Galvanized steel in accordance with ASTM C 847 "Standard Specification for Metal Lath."
 - 1) "Diamond Mesh" Lath, 3.4 pounds per square yard.

- 2) "Hi Rib" Lath, 3/8 inch rib, 3.4 pounds per square yard.
- 3) "Self-Furred Diamond Mesh" Lath, 3.4 pounds per square yard.
- b. Wire Fabric Lath:
 - 1) Woven: Galvanized steel in accordance with ASTM C 1032, "Specification for Woven Wire Plaster Base," and ASTM C 1066, "Specification for Installation of Lath and Furring to Receive Interior and Exterior Portland Cement-Based Plaster".
 - a) 1-1/2 inch x 17 gage (0.0540 inch) hexagon shaped mesh, 1.86 lbs. per square yard.
 - b) "Paper Backed" Woven Wire Fabric Lath and "Self-Furring" Woven Wire Fabric Lath are not acceptable.
 - 2) Welded: Galvanized steel in accordance with ASTM C 933, "Specification for Welded Wire Lath," and ASTM C 1066, "Specification for Installation of Lath and Furring to Receive Interior and Exterior Portland Cement-Based Plaster".
 - a) 1-1/2 inch x 1-1/2 inch x 16 gage (0.0625 inch) square shaped mesh, 1.14 lbs. per square yard.
 - b) "Paper Backed" Welded Wire Fabric Lath is not acceptable.
 - c) "Self-Furring" Welded Wire Fabric Lath without paper backing shall be acceptable. Cement Plaster, Embedded Mesh Leveling Coat, and Acrylic-enhanced Cementitious Finish System: .

- c. Stucco Base:
 - 1) Cement: Super Cement with Fibers.
 - 2) Fibers: Fiberglass reinforcing fibers compatible with cement plaster system manufacturer, no longer than 1/2 inch.
 - 3) Sand: Clean and washed sand complying with ASTM C 897 "Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters."

a) Grading:

U.S. STANDARD SIEVE	CUMULATIVE WEIGHT MINIMUM	PERCENT RETAINED MAXIMUM
D. 4	--	0
E. 8	0	10
F. 16	10	40
G. 30	30	65
H. 50	70	90
I. 100	95	100
J. 200	97	100

- 1. Leveling and Reinforcing Coat:
 - a. Leveling Material: as recommended by manufacturer.
 - b. Cementitious based leveling material.
 - c. Reinforcing Mesh: as recommended by manufacturer.
 - 1) Weight: 4.5 oz per yard.

- d. Surface Applied Liquid Bonding Agent: as recommended by manufacturer.
- e. Resinous emulsion with the following minimum requirements:
 - 1) Minimum tensile strength of 60 psi.
 - 2) Minimum compressive shear strength of 300 psi.
- f. Acrylic Finish Coat Colortek Paint Grade Exterior Stucco 30/30 with Acroloc Acrylic Admixture.

2.3 ACCESSORIES

- A. Fasteners: Shall be in accordance with ASTM C 1063, "Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster".
 - 1. Staples: 16 gage, galvanized steel.
 - a. In accordance with ASTM E1667 "Standard Specification for Driven Fasteners, Nails, Spikes and Staples."
 - b. Provide 1/4 inch furring wads at staple attachments for lath.
 - 2. Nails: galvanized steel.
 - a. In accordance with ASTM E1667 "Standard Specification for Driven Fasteners, Nails, Spikes and Staples."
 - b. Minimum, 7/16 inch (0.437 inch) diameter head and 11 gage (0.1205 inch) barbed, roofing or common nails.
 - c. Provide 1/4 inch self-sealing furring wads at nail attachments for lath.
 - d. Tie Nails: 10d galvanized nails.
 - e. Concrete Stub Nails: Corrosion Resistant.
 - 1) Minimum, 3/8 inch wide head.
 - 3. Screws at Wood Framing: Corrosion Resistant.
 - a. In accordance with ASTM C 1002, "Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs."
 - 1) Minimum 7/16 inch (0.437 inch) diameter pan wafer head and a 0.163 inch (#8) diameter shank with sharp-point.
 - b. Provide 1/4 inch self-sealing furring wads at screw attachments for lath.
 - 4. Screws at Metal Framing: Corrosion Resistant.
 - a. In accordance with ASTM C 954, "Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. to 0.122 in. in Thickness."
 - 1) Minimum 7/16 inch (0.437 inch) diameter pan wafer head and 0.163 inch (#8) diameter shank with self-drilling and self-tapping point.
 - b. Provide 1/4 inch self-sealing furring wads at screw attachments for lath.
 - 5. Power or Powder Actuated Fasteners:
 - a. In accordance with ASTM E 488 "Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements."
 - b. Size: min. 3/8 inch wide heads with 0.145 inch shank diameter, in length as required to achieve specified penetration.
 - c. Corrosion Resistant.
 - 6. Screw Anchor Fasteners:
 - a. In accordance with ASTM E 488 "Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements."
 - b. In accordance with valid ICC ESR testing applicable to installation conditions.
 - c. Size: 3/16 inch diameter, in length as required to achieve specified penetration.
 - d. Corrosion Resistant.

- e. Accessories for Screw Anchor Fasteners:
 - 1) Matched tolerance drill bit, dust removal device, and other accessories in accordance with written manufacturer's instructions and ICC ES Evaluation Report.
- 7. Wires:
 - a. Galvanized (Class 1 zinc coating) soft temper steel wire, in accordance with ASTM A 641, "Specification for Zinc-Coated (Galvanized) Carbon Steel Wire."
 - b. All wire diameters specified are uncoated and corresponds with United States Steel Wire Gauge (USSWG):
 - 1) Member to Member: Minimum 16 gage (0.0625 inch).
 - 2) Lath to Support Member: Minimum 18 gage (0.0475 inch).
 - 3) Lath to Metal Accessories: Minimum 18 gage (0.0475 inch).
 - 4) Lath to Lath: Minimum 18 gage (0.0475 inch).
- B. Open Corner Reinforcement:
 - 1. Cement Plaster: Expanded Metal Lath, AMICO "Cornalath" galvanized steel.
 - 2. Elastomeric Finish Coat: 4" x 9", 15 oz/sq.yd. minimum weight, glass fiber mesh.

2.4 MIXES

- A. Cement Plaster Mixes: Shall be in accordance with ASTM C 926, "Specification for Application of Portland Cement-Based Plaster."
 - 1. Scratch Coat Mix (No additions of plasticizing agents allowed):
 - a. 2.5 to 4 parts one part Super Cement.
 - 2. Brown Coat Mix (No additions of plasticizing agents allowed):
 - a. 3 to 5 parts sand per 1 part Super Cement.
 - 3. Leveling and Reinforcing Coat:
 - a. Specified system materials.
 - b. Mesh.
 - 4. Primer/base coat: Mixed thoroughly, immediately prior to use with a paddle mixer.
 - a. For application with a sprayer, dilute the Omega RapidPrime with 8oz of clean, potable water.
 - 5. Acrylic -Enhanced Cementitious Finish Coat
 - a. Specified System materials.
 - 1) Acrylic Finish Coat, Colortek Paint Grade Exterior Stucco 30/30 with Acroloc acrylic admixture.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
 - 1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual, which affect the execution of work under this specification section.
 - 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.

3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:

1. Coordinate work under this specification section with all related work specified under other sections to ensure proper and adequate interface of work.
 - a. Verify and locate framing and or backing necessary for proper installation of cement plaster system.
2. Integrate Water barriers and Penetration Flashing with all flashings from all other related work for proper shedding of water out of the building.
3. Protection:
4. Project Inspector shall verify that all stud cavity walls are free of moisture and dry prior to any other construction that fully closes the wall cavity.
5. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
 - a. Provide temporary protections and enclosures for other work.

B. Surface preparation:

1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:

1. It is the intent to provide a weather resistant exterior plaster system envelope upon completion.
 - a. Overlap and shingle fashion all substrate barriers, papers and penetration flashing with accessories in such a way as to shed water at the midpoint flashing (i.e. floor juncture flashing, or head flashing at openings and penetrations), or allow it to weep to drainage weep holes at the foundation sill screed in accordance with the requirements of the CBC Section 1403 and 1404.2.
2. In accordance with the manufacturer's recommendations, and the following code requirements.
3. In accordance with ASTM C 1063, "Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster" and ASTM C 926, "Application of Portland Cement-Based Plaster."
 - a. In accordance with CBC Chapter 7, Chapter 7A, Chapter 14, and Chapter 25.
 - b. In accordance with listed UL Assemblies at designated fire rated assemblies.
 - c. In accordance with "The Plaster and Drywall Systems Manual" (PDSM).
 - d. In accordance with Regulatory Requirements.

B. Layout:

1. Set plumb, level, and square.
2. Lines of all Metal Accessories shall be straight and true. Set accessories to create a cement plaster finish plane within a tolerance of 1/8 inch in 10 feet.

3. Apply all Brown and Finish Coats of plaster to create a finish plane with a tolerance of 1/8 inch in 10 feet.
- C. Suspension System:
1. General:
 - a. Installation shall be in accordance with ASTM C 1063 "Standard Specification of Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement Based Plaster," and shall comply with additional DSA requirements.
 - b. Provide trapeze or other supplementary support members at obstructions to typical hanger spacing. Provide additional hangers, struts and/or braces as required at all ceiling breaks, soffits or discontinuous areas.
 - c. Attachment to the structure as indicated.
 - 1) Hanger or Bracing Wire anchors to the structure shall be installed in such a manner that the direction of the wire aligns as closely as possible with the direction of the forces acting on the wire.
 2. Hangers:
 - a. Hanger wires shall be spaced a maximum of 4'-0" on center each way.
 - b. Hanger wires shall hang straight down. Splices in hanger wires are not permitted.
 - c. Separate all hanger and bracing wires at least six inches (6") from all unbraced ducts, pipes, conduit, etc.
 - d. Fasten hanger wires with not less than three tight turns within a distance of 1-1/2 inches.
 3. Bracing Assemblies:
 - a. Provide Bracing assemblies for every 144 square feet, spaced not more than 12 feet by 12 feet on center.
 - 1) Provide Bracing assemblies for every 96 square feet spaced not more than 8 feet by 12 feet on center at Fire Rated Assemblies.
 - b. Provide Bracing assemblies for every 96 square feet spaced not more than 8 feet by 12 feet on center at Non-Fire Rated and Fire Rated assemblies.
 - c. Suspension systems not exceeding the area and or spacing required for bracing assemblies, are not required to have bracing assemblies when surrounded by walls which connect directly to the structure above and are attached to at least two adjacent walls
 - d. Provide bracing assemblies at locations not more than 1/2 the required spacing from each perimeter wall and at edge of ceiling offsets.
 - e. The slope of the Bracing Wires shall not exceed 45 degrees from the plane of the ceiling and shall be taut. Splices in bracing wires are not permitted.
 - f. Fasten bracing wires with not less than four tight turns within a distance of 1-1/2 inches.
 4. Main Runners:
 - a. Main runners shall be spaced a maximum of 4'-0" on center.
 - b. Hanger wires shall be saddle-tied around main runners.
 - c. Where main runners are spliced, the ends shall be overlapped not less than 12 inches with flanges of channels interlocked and securely tied near each end of the splice with double loops of 16 gauge (0.0625 inch) wire or double loops of twin strands of 18 gauge (0.0475 inch) wire.
 - d. Locate main runners within 6 inches of the paralleling walls to support the ends of the cross furring. The ends of main runners shall be supported by hangers located not more than 6 inches from the ends.
 - e. Maintain 1 inch clearance between the ends of the main runners and the abutting masonry or concrete walls, partitions and columns.

- f. All recessed or drop-in light fixtures, as well as ceiling mounted mechanical air terminals and services, shall be supported directly by main runners or by supplemental framing which is supported by main runners and positively attached with screws or other approved connectors.
 - g. Surface mounted fixtures shall be attached to a main runner with a positive clamping device made of material with a minimum of 14 gage. Rotational spring clamps do not comply.
5. Cross-Furring:
- a. Cross furring shall be spaced a maximum of 2'-0" on center.
 - b. Cross furring shall be saddle-tied to main runners with 16 gage wire, or double strand 18 gage wire .
 - c. Where cross furring members are spliced, the ends shall be overlapped not less than 8 inches, with flanges of channels interlocked, and securely tied near each end of the splice with double loops of 16 gage wire or double loops of twin strands of 18 gage wire.
 - d. Cross furring shall not come into contact with abutting masonry, reinforced concrete walls, or partitions.
- D. Installation of Line Wire:
- 1. Apply Line Wire prior to the placement of the water barriers.
 - 2. Line Wire shall be installed at open framing of exterior vertical assembly.
 - 3. Install Line Wire perpendicular to the framing members at 6" on center and secured to every fourth framing member with a screw.
 - a. Stretch Line Wire sufficiently tight to minimize bulging of the Water Barriers and to ensure a uniform thick scratch coat.
- E. Installation of Water Barriers:
- 1. Install Water Barriers after installation of Line Wire at open framing.
 - 2. Water barriers shall be installed at all exterior walls, exterior soffits, and at interior walls considered to be "Semi-Wet" and "Wet" exposures (i.e. Toilets, Showers, Lockers, Kitchens and etc.).
 - 3. Install Water Barriers with Penetration Flashing, Metal Accessories, and all other related work in "shingle" or "weatherboard" fashion.
 - 4. Water Barriers shall be installed as required in CBC Sections 1404.2, 1404.3, 1405, and 2510.6 as follows:
 - a. Provide two layers of Water Barriers.
 - 1) One inner layer of Building Wrap (also qualifies as an "Air Barrier"):
 - a) Seal all laps and penetrations with a 3" wide minimum Sealing Tape.
 - 2) One outer layer of Building Paper.
 - b. The Water Barrier shall be applied horizontally, with the upper layer lapped over the lower layer not less than 6 inches and free from holes and breaks.
 - 1) Where vertical joints occur, barrier shall be lapped not less than 6 inches.
 - c. Exposure:
 - 1) Maximum exposure of Water Barriers shall be 30 days prior to plaster application or less as required by Water Barrier Manufacturer.
 - a) Protect Water Barriers from the elements (both exposure to the sun and water) with a temporary 6-mil visqueen barrier or other material approved by the barrier manufacturer.
- F. Installation of Penetration Flashing:

1. Apply Penetration Flashing in conjunction with Water Barriers, Metal Accessories and all other related work.
 2. Install Penetration Flashing at all openings and penetrations at all exterior walls and at interior walls considered to be "Semi-Wet" and "Wet" exposures (i.e. Toilets, Showers, Lockers, Kitchens, etc.).
 3. Install Penetration Flashings with Water Barriers, Metal Accessories and all other related work in "shingle" or "weatherboard" fashion.
 4. Penetration Flashings shall be installed as required in CBC Sections 1405.3 in 9" widths and continuous to 9" past all intersections around all openings, penetrations and termination of plaster systems.
 - a. Should any penetration warrant a greater width of wall flashing, provide 12" wide flashing as required.
 - b. When an object extends through the Cement Plaster System, return the edge of the Penetration Flashing 1" and apply to the sides of the penetrating item.
 5. Objects such as electrical back-boxes, electrical speaker enclosures, penetrations created by structural members, and the like.
- G. Installation of Metal Accessories:
1. Apply Metal Accessories in conjunction with Water Barriers, Penetration Flashings and all other related work.
 2. Install Metal Accessories as required to delineate cement plaster work into areas of the following maximum size and shall be in addition to locations shown on the drawings:
 - a. Vertical surfaces 144 sq.ft.
 - b. Horizontal and other non-vertical surfaces 100 sq.ft.
 - c. Length-to-width ratios of not greater than 2-1/2:1.
 - d. Distances not greater than 18 feet.
 3. Install Metal Accessories with Water Barriers, Penetration Flashing Sheets and all other related work in "shingle" or "weatherboard" fashion.
 4. Install all Metal Accessories in accordance with manufacturer's instructions, and the PDSM.
 - a. All Metal Accessories shall be fully supported in accordance with CBC, secure flanges to framing.
 - b. Installed in 10 foot lengths wherever possible.
 - c. All joints (butt, mitered, bent, continuing around corners, or changing directions) shall be cut accurately, welded, or folded, sealed, pop-riveted and sealed again, for a watertight joint.
 - 1) Special Trim Shapes joints (butt, "T", "+", "L" and inside/outside intersections) provide manufacturer's flashing connectors and factory fabricated intersections to connect shapes.
 - a) Provide End Caps at all open ends and when terminated at opening frames and all other construction.
 - b) Butt Joints shall be flush and align with other metal accessories.
 - c) Seal all intersections and ends.
 - 2) Maintain the water barrier continuously behind any joint.
 - 3) Joints shall occur at nearest possible expansion or control joints.
 - d. When an object extends through the Cement Plaster System, accurately cut and install in "shingle" or "weatherboard" fashion the Metal Accessories around the penetration. Apply sealant between the metal accessories and the penetrating object.
 5. Metal Accessories shall be attached to framing members at maximum 7 inches o.c. along supports.

- a. Single Point Separation Screeds can be wire tied over Metal Lath.
- b. Where dissimilar metals come into surface contact provide electrolytic protection between dissimilar metals using neoprene, plastic sheet, EPDM rubber or other protective coating.

H. Installation of Metal Lath:

1. General:

- a. Apply Metal Lath after the installation of Line Wire, Water Barriers, Penetration Flashings and Metal Accessories.
 - b. Install the various types of Metal Lath at the following conditions:
 - 1) Diamond Mesh Lath at horizontal and vertical surfaces over open framing members at 16 inches on center.
 - 2) Hi Rib Lath at horizontal and vertical surfaces over open framing members at 24 inches on center.
 - 3) Self Furred Diamond Mesh Lath at over Masonry and Concrete surfaces.
 - 4) Woven Wire Fabric Lath over Solid Sheathing.
 - 5) Welded Wire Fabric Lath over Solid Sheathing.
 - c. Apply Metal Lath in accordance with all applicable portions of CBC Chapters 7 and 25, and ASTM C 1063, "Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster".
 - 1) Metal Lath shall be applied with long dimension of sheet perpendicular to the framing members to which it is attached.
 - a) All fasteners shall be corrosion resistant equal to or superior to that of the lath.
 - b) All lath shall be furred out away from supports and solid substrate at least 1/4 inch.
 - c) Lath shall be attached to framing members at not more than 7" o.c. along framing members except for 3/8-in. rib metal lath shall be attached at each rib.
 - 2) The Metal Lath shall be broken at all metal accessories and cut into panels that are defined by the edges of the cement plaster metal accessories, expansion joints and the like.
 - a) Perimeter of the lath panel shall be wire tied to the cement plaster metal accessories.
 - b) No joints shall be permitted at any angle or corner.
 - 3) Lapping of Metal Lath.
 - a) Side laps shall be secured to framing members and shall be wire tied between supports with No. 18 gage (0.0475-inch) galvanized annealed steel wire at 9" o.c. maximum.
 - b) Where end laps occur between the framing members or between attachments, the end of the metal lath sheets shall be laced or wire tied with No. 18 gage (0.0475 inch) galvanized annealed steel wire.
 - c) Expanded Metal Lath shall be lapped 1/2-inch or nest the edge ribs at sides and 1" at ends.
 - d) Wire Fabric Lath shall be lapped one mesh at the sides and the ends.
2. Wood Frame Construction:
- a. Horizontal Framing:
 - 1) Roofing nails driven flush with the plaster base providing not less than 3/4-in. penetration into framing members when lath is installed.

- a) Nail attachments at Hi-Rib Lath to provide not less than 1-3/4 inch penetration into framing members when lath is installed and shall be bent over ribs.
 - 2) Screws shall penetrate not less than 5/8-inch into framing members when lath is installed and shall engage not less than three strands of lath.
 - a) Screw attachments at Hi-Rib Lath shall pass through, but not deform rib.
 - 3) Where Water Barriers are not required, either of the following attachments shall be used in addition to the methods of attachment set forth in CBC Table No. 2507.2 per CBC Section 2507.3:
 - a) Secure lath to alternate supports with ties consisting of a double strand of No. 18 W & M gage (0.475 inch) galvanized annealed wire at one edge of each sheet of lath. Wire ties shall be installed not less than 3 inches back from the edge of each sheet and shall be looped around stripping, or attached to an 8d common wire nail driven into each side of the joist 2 inches above the bottom of the joist or to each end of a 16d common wire nail driven horizontally through the joist 2 inches above the bottom of the joist and the ends of the wire secured together with three twists of the wire.
 - b) Secure lath to each support with 1/2 inch wide, 1-1/2 inch long No. 9 W & M gage (0.1483 inch), ring shank, hook staple placed around a 10d common nail laid flat under the surface of the lath not more than 3 inches from edge of each sheet. Such staples may be placed over ribs of 3/8 inch rib lath or over back wire of welded wire fabric or other approved lath, omitting the 10d nails.
- b. Vertical Framing:
- 1) Wire staples driven flush with plaster base, crown not less than 3/4 inch, shall provide not less than 3/4 inch penetration into framing members when lath is installed and shall engage not less than three strands of lath.
 - 2) Common nails or roofing nails driven to penetration of not less than 3/4 inch into framing members when lath is installed and shall be bent over to engage not less than three strands of lath.
 - a) Nail attachments at Hi-Rib Lath shall be bent over ribs.
 - 3) Screws shall penetrate not less than 5/8 inch into framing members when lath is installed and shall engage not less than three strands of lath.
 - a) Screw attachments at Hi-Rib Lath shall pass through, but not deform rib.
3. Metal Framed Construction:
- a. Horizontal Framing:
- 1) Screws shall project not less than 3/8-in. through metal framing member when the lath is installed and shall engage not less than three strands of lath.
 - a) Screw attachments at Hi-Rib Lath shall pass through, but not deform rib.
 - 2) Where Water Barriers are not required, securely attach to metal framing members with No. 18 gage (0.0475 inch) wire ties, clips, hog rings or approved equivalent attachments.
 - a) Securely attach Hi-Rib Lath to open-web steel joists by single ties of galvanized, annealed steel wire not less than No. 18 gage (0.0475 inch), with the ends of each tie twisted together 1-1/2 times.
- b. Vertical Framing:

- 1) Screws shall project not less than 3/8-in. through metal framing members when the lath is installed. and shall engage not less than three strands of lath.
 - a) Screw attachments at Hi-Rib Lath shall pass through, but not deform rib.
- 2) Where Water Barriers are not required (Interior Walls), securely attach to metal framing members with No. 18 gage (0.0475 inch) wire ties, clips, hog rings or approved equivalent attachments.
4. Concrete Substrates, Horizontal and Vertical:
 - a. Install power driven or power actuated fasteners:
 - 1) Penetration, min.: 3/4 inch.
 - 2) Location: One fastener at each corner, and one fastener at midpoint of long dimension of lath sheet. Balance of locations may be same fasteners or hardened concrete stub nails.
 - 3) Spacing:
 - a) Horizontal (row), max.: 16 inches on center.
 - b) Vertical (column), max: 7 inches on center.
 - 4) Wire tie laps and metal accessories with expanded metal flanges. Power/powder-actuated fasten accessories with solid flanges.
5. Masonry Substrates, Vertical:
 - a. Install screw anchor fasteners per ICC ES Evaluation Report installation requirements.
 - 1) Penetration: 1-1/2 inch.
 - 2) Spacing:
 - a) End distance, min.: 3 inches.
 - b) Edge distance, min.: 1-1/2 inch.
 - c) Any direction, min.: 1-1/2 inch.
 - 3) Pattern Spacing:
 - b. Horizontal (row), max: 16 inches.
 - c. Vertical (column), max: 7 inches.
6. Wire tie laps and metal accessories with expanded metal flanges. Screw anchor fasten accessories with solid flanges.
7. Attach accessories in such a manner as to ensure proper alignment during plaster application.

I. Cement Plaster Installation:

1. General: Each plaster coat shall be applied without interruption to entire wall or ceiling panels to eliminate cold joints and abrupt changes in the uniform appearance of succeeding coats. Panels are defined by naturally occurring interruptions in the plane of the plaster, such as corner angles, rustications, openings, and control joints.
2. Nominal Cement Plaster Thickness over Metal Lath:
 - a. At open framing and sheathing substrates, Vertical and Horizontal Surfaces: 7/8" nominal.
 - 1) Scratch Coat thickness: 3/8"
 - 2) Brown Coat thickness: 3/8"
 - 3) Finish Coat thickness: 1/8"
 - b. At concrete or masonry substrates, Vertical and Horizontal Surfaces 7/8" nominal.
 - 1) Scratch Coat thickness: 1/2"
 - 2) Brown Coat thickness: 1/4"
 - 3) Finish Coat thickness: 1/8"
3. Nominal Cement Plaster Thickness over Concrete or Masonry Substrates:

- a. Masonry Vertical Surfaces: 1/2" nominal.
 - 1) Bond Coat: N/A
 - 2) Brown Coat thickness 3/8"
 - 3) Finish Coat thickness 1/8"
 - b. Masonry Horizontal Surfaces: 3/8" nominal.
 - 1) Bond Coat: N/A
 - 2) Brown Coat thickness 1/4"
 - 3) Finish Coat thickness 1/8"
 - c. Concrete Vertical and Horizontal Surfaces: 3/8" nominal.
 - 1) Bond Coat: N/A
 - 2) Brown Coat thickness 1/4"
 - 3) Finish Coat thickness 1/8"
 - d. Where the installed plaster thickness over masonry will exceed the nominal 1/2 inch thickness, the plaster system shall be the three coat application over self-furred expanded metal lath.
 - e. Where the installed plaster thickness over concrete will exceed the nominal 3/8 inch thickness, the plaster system shall be the three coat application over self-furred expanded metal lath.
4. Scratch Coat Installation:
- a. Cover Lath totally and completely with Scratch Coat Mix.
 - b. Finish: Heavily scratched at right angles to framing members to provide strong mechanical key for Brown Coat.
 - c. Curing: Continuously moist cure a minimum of 48 hours immediately after installation and prior to application of Brown Coat.
5. Bond Coat Installation:
- a. Apply "Surface Applied Liquid Bonding Agent" Mix solid over masonry or concrete and fill all pores completely to form bonding, water resistant finish.
 - b. Cure: In accordance with Manufacturer's requirements and ASTM C 932 "Specification for Surface-Applied Bonding Compounds for Exterior Plastering".
6. Brown Coat Installation:
- a. Apply Brown Coat Mix to slightly damp, and cured Scratch Coat.
 - b. Finish: Dry rod to a straight even plane.
 - c. Float to densify at 1/8 inch in 10 feet and leave rough for finish.
 - 1) At exterior horizontal soffits with recessed light fixtures, provide a smooth and level brown coat finish around the perimeter of the light fixture housing.
 - a) After installation of the brown coat, knock down any ridges and provide a smooth trowel finish within a distance of 3 inches around the light fixture housing. This level of finish is required, so that the light fixture lens (with a compression gasket) can be installed with full contact against the plaster system.
 - b) Coordinate with the electrical contractor and obtain a sample fixture lens, and conduct a pre-cement plaster installation meeting to discuss this topic.
 - d. Curing: Continuously moist cure a minimum of 48 hours immediately after installation and dry cure a minimum of 7 days, allow time for plaster to shrink prior to application of finish coats.
7. Acrylic Finish Coat Installation:
- a. Exterior Cement System: Acrylic-Enhanced Cementitious Finish System:
 - 1) New concrete, stucco, and masonry must be clean and cured a minimum of 28 days.

- 2) Prime with manufacturer's recommended primer.
- 3) Provide Open Corner Reinforcement where cement plaster is not divided or separated at opening corners. Place diagonally at all corners of openings and apply with cement adhesive on cured Brown Coat.
- 4) For application techniques refer to manufacturer's technical bulletins and recommendations. See manufacturer's recommendations for application over existing concrete surfaces.
- 5) Finish with manufacturer's finish coat in accordance with manufacturer's recommendations for application, curing times and temperature ranges.
- 6) Always maintain a wet edge and work to corners or joints.
- 7) Use material with the same batch number within wall section.
- 8) Apply in two 1/16" coats. Allow first coat to dry enough that it will not be disturbed during the application of the second coat. When second coat is partially dry, trowel smooth. Use light consistent misting with water.
- 9) Texture: Smooth

3.4 REPAIR / RESTORATION

- A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.5 FIELD QUALITY CONTROL

- A. General: Comply with ASTM C 926 "Standard Specification for Application of Portland Cement-Based Plaster."
 1. Do not deviate more than plus or minus 1/8 inch in 10 feet from a true plane in finished plaster surfaces, as measured by a 10-foot straightedge placed on surface.
 2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground, unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
 3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.
- B. Site Tests:
 1. As required by Regulatory Requirements.
 2. Mock-Up Assemblies:
 - a. Water Spray Test: Upon completion of the installation of the Mock-Up Assembly, conduct test for water penetration in according to AAMA 501.2 requirements.
 - 1) The Project Inspector, the Architect, Contractor's Superintendent and Sub-contractor's Superintendent shall visually inspect for water penetration.
 - 2) A Thermal Imaging process conducted by the Owner's Testing Laboratory Service, shall be used for additional inspection for water penetration.
 - 3) Cost of additional testing and inspection required due to failure for water tightness shall be borne by the Contractor.
 - b. Reports:
 - 1) Project Inspector and/or Owner's Testing Laboratory Services shall provide a written report noting the installation and water tightness of the Mock-Up Assemblies tested.
- C. Inspection:

1. As required by Regulatory Requirements and in accordance with CBC Section 2503.
2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.

3.6 CLEANING

- A. Clean in accordance with Specification Section – PROJECT CLOSEOUT.
 1. Clean any soiled surfaces immediately.
 2. Finish shall be clean and ready for the application of any additional finishes.
 3. In accordance with manufacturer's written instructions and recommendations.
- B. Remove temporary protection and enclosure of other work.
- C. Promptly remove plaster from door frames, window and other surfaces not indicated to be plastered.
- D. Repair floors, walls and other surfaces stained, marred or other wise damaged during plastering

END OF SECTION

SECTION 092900 – GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install all gypsum board materials, suspension systems, furring, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 04 22 00 CONCRETE MASONRY UNITS
 4. 06 10 00 ROUGH CARPENTRY
 5. 06 41 23 MODULAR CASEWORK
 6. 07 21 00 INSULATION
 7. 07 92 00 SEALANTS
 8. 08 31 13 ACCESS DOORS AND FRAMES
 9. 08 33 00 COILING DOORS
 10. 09 22 16 METAL FRAMING
 11. 09 30 00 TILE
 12. 09 50 00 ACOUSTICAL CEILINGS
 13. 09 65 10 RESILIENT BASE AND ACCESSORIES
 14. 09 72 00 WALL COVERINGS
 15. 09 91 00 PAINTING
 16. 10 05 00 MISCELLANEOUS SPECIALTIES
 17. 10 11 00 VISUAL DISPLAY BOARDS
 18. 10 14 00 IDENTIFYING DEVICES
 19. 10 21 13 TOILET PARTITIONS
 20. 10 26 00 WALL AND CORNER GUARDS
 21. 10 28 13 TOILET ACCESSORIES
 22. 10 44 00 FIRE PROTECTION SPECIALTIES
 23. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

- A. Standards:
1. In accordance with the following standards:
 - a. CISCA Ceilings & Interior Systems Construction Association.
 - b. DITF Drywall Industry Trust Fund.
 - c. GA Gypsum Association.
 - d. MPI Master Painters Institute
 - e. PDCA Painting and Decorating Contractors of America.
 - f. PDSM Plaster and Drywall Systems Manual, ©1988 by BNI and McGraw-Hill, Inc., Third Edition.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data.
 - a. Gypsum board fastening schedule: Indicate type, size and spacing of fasteners for each type of framing and fire resistive condition.
 - b. Manufacturer's written recommended construction instructions or handbook for all gypsum board panel products and accessories.
 - c. Manufacturer's data for all types of gypsum board used on this project.
 2. Samples.
 - a. Provide 24 inch square samples for all textures for each level of finish.
 - b. Provide 4 inch lineal samples of each piece of metal trim accessory specified.
 3. Quality Assurance/Control Submittals:
 - a. Certificates:
 - 1) General Construction: Certificate signed by the Contractor on Contractor's letterhead.
 - 2) Products: Certificates signed by manufacturers of gypsum board assembly components.
 4. Closeout Submittals in accordance with Specification Section -PROJECT DOCUMENTS.
 - a. Warranty in accordance with Specification Section - WARRANTIES.

1.4 QUALITY ASSURANCE

- A. Qualifications:
1. Material Qualifications:
 - a. Empty containers shall not be removed from site without the Project Inspector's approval.
 2. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - 1) Helpers and apprentices used for such work shall be under full and constant supervision at all times by thoroughly skilled gypsum board installers.
 - 2) In the acceptance or rejection of installed gypsum board, no allowance will be made for lack of skill on the part of installers.
- B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. IR Interpretation of Regulations.
- C. Certificates:
1. General Construction: Contractor to certify that work provided, meets or exceeds the requirements of this section.

2. Manufacturers of gypsum board assembly components certify that their products comply with specified requirements.
 - a. Certify that all adhesive and compound materials have a good shelf life longer than the construction period of this project.

D. Mockups:

1. Before starting the finishing of gypsum board surfaces, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and qualities of materials and execution.
 - a. Install mockups for the following applications:
 - 1) All surfaces without finish texture.
 - 2) All surfaces without finish texture to be painted.
 - 3) All surfaces with finish texture to be painted.
 - b. Simulate finished lighting conditions for review of mockups.
 - c. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Meetings:

1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:

1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:

1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and protection:

1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.6 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified gypsum board products manufacturer:
 - a. NATIONAL GYPSUM COMPANY.
 - 1) Wallboard "REGULAR"
 - 2) Water-Resistant "XP GYPSUM BOARD"
 - b. Acceptable alternative manufacturers:
 - 1) PABCO:
 - a) Wallboard "REGULAR" AND "TYPE X"
 - b) Water-Resistant "MOLD CURB PLUS"
 - 2) UNITED STATES GYPSUM COMPANY - "SHEETROCK"
 - a) Wallboard "SW EDGE"
 - b) Water-Resistant: "MOLD TOUGH"
 - 2. Specified Impact and Abuse board products manufacturer:
 - a. NATIONAL GYPSUM COMPANY
 - 1) Impact Board "HI-IMPACT XP"
 - b. Acceptable alternative manufacturers:
 - 1) PABCO.
 - a) Impact Board "HI-IMPACT"
 - 2) UNITED STATES GYPSUM COMPANY - Walls only.
 - a) Impact Board "MOLD TOUGH VHI"
 - 3. Specified gypsum board accessories product manufacturer:
 - a. Prep. Coat (Drywall Primer):
 - 1) WESTPAC MATERIALS "PREP COAT"
 - 2) Acceptable alternative manufacturer:

- a) UNITED STATES GYPSUM - SECUROCK First Coat Primer.
 - b. Primer-Surfacers: "TUFF-HIDE"
 - 1) UNITED STATES GYPSUM COMPANY.
 - c. Other Accessories:
 - 1) CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).
 - 4. Specified relevel molding products manufacturer:
 - a. FRY REGLET CORPORATION.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Furring:
- 1. Metal Angles: 24 gage galvanized steel.
 - a. 1-3/8 inch x 7/8 inch 190 lbs./1000 feet weight.
 - 2. Cold Rolled Channels: 16 gage galvanized steel.
 - a. For furred walls and ceilings:
 - 1) 3/4 inch x 1/2 inch flange: 300 lbs./1000 feet weight.
 - 2) 1-1/2 inch x 17/32 inch flange: 500 lbs./feet weight.
 - 3) 2 inch x 17/32 inch flange: 590 lbs./1000 feet weight.
 - 3. Resilient Channels (USG's RC-1): 25 gage corrosion resistant steel.
 - a. Pre-punched holes at 4 inches on center in the flange to facilitate screw attachment only into framing. For improving sound transmission loss through framed partitions and ceilings.
 - 1) 1/2 inch flange x 2-1/2 inch overall w/1-1/2 inch offset flange x 1/2 inch offset:
 - a) 200 lbs./1000 feet weight.
 - 4. Zee Channels: 24 gage corrosion resistant steel.
 - a. 1 inch thick x 7/8 inch x 1-1/4 inch 224 lbs./1000 feet weight.
 - b. 1-1/2 inch x 7/8 inch x 1-1/4 inch 269 lbs./1000 feet weight.
 - c. 2 inch x 7/8 inch x 1-1/4 inch 313 lbs./1000 feet weight.
 - d. 3 inch x 7/8 inch x 1-1/4 inch 400 lbs./1000 feet weight.
 - 5. Hat Channels:
 - a. 7/8 inch x 2-9/16 inch 276 lbs./1000 feet weight (25 gage).
 - b. 7/8 inch x 2-9/16 inch 515 lbs./1000 feet weight (20 gage).
 - 6. Channel Clips:
 - a. Pre-formed galvanized wire used for attaching metal furring channels to cold rolled channels and single gypsum panel systems only.
 - 1) 1-1/2 inch x 2-3/4 inch 38 lbs./1000 feet weight.
- B. Wallboard: For interior walls and ceilings.
- 1. Standard: In accordance with ASTM C 1396 "Standard Specification for Gypsum Board."
 - 2. Size: See drawings for specific thickness locations.
 - a. 5/8 inch thick by 4 foot wide maximum by practical length to minimize joints.
 - 1) When curved walls are indicated on the drawings, provide multiple layers of 1/4 inch & 3/8 inch thick by 4 foot wide maximum by practical length to minimize joints.
 - 3. Long Edges: SW Tapered.

4. Core Type:
 - a. Non-Fire Rated: Regular.
 5. Finish: Natural-finish face paper suitable for paint, wallpaper or other decorations.
- C. Water-Resistant: For interior walls subjected to, but not constant, moisture and humidity and at adhesive application of ceramic tile and wallcoverings.
1. Standard: In accordance with ASTM C 1396 "Standard Specification for Gypsum Board."
 - a. Surface Burning Characteristics: ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials":
 - 1) Flame Spread: 20.
 - 2) Smoke Developed: 0.
 2. Size - see drawings for specific thickness locations:
 - a. 5/8 inch thick by 4 foot wide maximum by practical length to minimize joints.
 3. Long Edges: Tapered.
 4. Core Type:
 - a. Non-Fire Rated: Regular water-resistant core all the way through.
 - b. Fire Rated: Type X and water-resistant additives all the way through, at fire-resistive-rated assemblies.
 5. Finish: Multi-layered paper facings, chemically treated to resist moisture penetration.
 6. Color of the face paper is dependent on the manufacturer.
- D. Impact Board: For interior walls requiring greater impact resistance.
1. Standard: In accordance with ASTM C 1629 "Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels."
 - a. Surface Abrasion Resistance: ASTM D 4977 "Test method for Granule Adhesion to Mineral Surfaced Roofing by Abrasion": Level 3.
 - b. Indentation Resistance: ASTM D 5420 "Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a falling Weight (Gardner Impact)": Level 1.
 - c. Impact/Penetration Resistance, Soft Body: ASTM E 695 "Standard Method for Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading": Level 3.
 - d. Impact/Penetration Resistance, Hard Body: ASTM C 1629 "Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels," Annex 1: Level 3.
 2. Mold/Mildew Characteristics:
 - a. Mold Resistance: ASTM G 21 "Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi": 0.
 - b. Mold Resistance: ASTM D 3273 "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber": 10.
 - c. Water Absorption: ASTM C 173 "Test method for Air Content of Freshly Mixed Concrete by the Volumetric Method": less than 5 percent.
 3. Surface Burning Characteristics: ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials":
 - a. Flame Spread: 15.
 - b. Smoke Developed: 0.
 4. Size: See Drawings for specific thickness locations:

- a. 5/8 inches thick by 4 feet wide maximum by practical length to minimize joints.
 - 5. Long Edges: Tapered.
 - 6. Core Type:
 - a. Moisture resistant core with an embedded fiberglass mesh.
 - b. Non-Fire-Rated: --
 - c. Fire Rated: Type X at fire-resistive-rated assemblies.
 - 7. Finish: Abrasion and mold/mildew/moisture resistant paper on the face side, and abrasion and mold/mildew/moisture resistant paper on the back side.
 - a. Color of the face paper is dependent on the manufacturer.
- E. Metal Accessories:
- 1. Corner Beads:
 - a. Outside Corner, 1-1/4 inch x 1-1/4 inch galvanized:
 - 1) CDBS / USG "Dur-A-Bead" #103.
 - 2. Edge Trim:
 - a. "U"-Shaped 1 inch galvanized CDBS / USG #200-A, size to fit gypsum board.
 - b. "L"-Shaped 1 inch galvanized CDBS / USG #200-B, size to fit gypsum board.
 - 1) When "U"-Shaped molding above cannot be used.
 - 3. Control Joint:
 - a. 1-3/4" wide, 1/4" wide center channel with removable tape strip:
 - 1) CDBS / USG #093.
 - 4. Reveal Moldings (Aluminum Trim): Moldings listed below are manufactured by FRY REGLETS, or approved equivalent.
 - a. "L" Trim Molding Sized to fit gypsum board.

2.3 ACCESSORIES

- A. Water:
 - 1. Clean, fresh and free from deleterious amounts of foreign material.
- B. Fasteners:
 - 1. At Gypsum Board: In accordance with the manufacturer's written recommendations and the following:
 - a. Nails: In accordance with CBC Chapter 7 and ASTM C 514 "Standard Specification for Nails for the Application of Gypsum Board."
 - b. Screws: In accordance with CBC Chapter 7, ASTM C 1002 "Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs," type S, G, and W, and ASTM C 954 "Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness," Type S-12.
 - 1) Provide "Bugle Head" screws that help prevent damage to the gypsum core and face paper.
 - c. Adhesives: In accordance with ASTM C 475 "Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board."
 - 1) Commercial adhesives bridging minor irregularities in the base or framing at "non-fire-rated" construction.
 - a) In accordance with ASTM C 557 "Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing."

- C. Joint reinforcement tape and joint compounds:
1. In accordance with ASTM C 474 "Standard Test Methods for Joint Treatment Materials for Gypsum Board Construction" and C 475 "Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board," and Gypsum Board Manufacturer's written recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.
 - a. Joint Tapes:
 - 1) Paper reinforcing tape, unless otherwise indicated.
 - 2) Polymer-coated, open glass-fiber mesh for cementitious backer units.
 - b. Setting-Type Joint compounds for gypsum board: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.
 - 1) When used for taping and filling only, use formulation that is compatible with other joint compounds applied over it.
 - 2) When used for pre-filling gypsum board joints, use formulation recommended by gypsum board manufacturer for this purpose.
 - 3) When used for filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile, use formulation recommended by the gypsum board manufacturer for this purpose.
 - 4) When used for topping compound, use sandable formulation.
- D. Prep. Coat: Provide a preparation coat of the specified material to gypsum board surfaces to be decorated with all paints.
- E. Primer-Surfacer: "TUFF-HIDE" • by USG, Interior White Latex High Build Spray for a smoother paint finish over all types of drywall, 9.8 to 13 mils DFT in one spray application
- F. Textured Finish Coats: Gypsum Board manufacturer supplying the products to this project shall also supply the Texture Finishes to provide distinctive appearance and surface decoration to gypsum board panel walls and ceilings, and as scheduled at the end of this Specification Section.
- G. Other Materials: All other miscellaneous materials, not specifically described, but required for a complete and proper installation of gypsum board, shall be as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:

1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
2. Coordinate proper placement of ceiling mounted tracks, accessories, light fixtures, HVAC, registers and other items, which are to be integrated with gypsum board ceilings.

B. Protection:

1. Do not begin work until all rooms have been protected against the weather, and the building is covered and fully enclosed. Wet gypsum board after installation shall be removed and replaced at no extra cost to the Owner.
2. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:

1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with Regulatory Requirements.
3. Set plumb, level, and square.

B. Layout:

1. Lines shall be straight and true.
2. Control Joints:
 - a. Layout in accordance with GA-234-08 for both Non-Rated and Rated ceiling conditions as follows:
 - 1) Provide Control Joints at in an uninterrupted straight plane exceeding 30 ft. in length and total area between control joints, such that no area exceeds 900 sq.ft.

C. Furring Channels:

1. Attach hat channels at 16" o.c. to framing members at 24" o.c. maximum with one 1-1/2" Type "G" screw at each bearing point. Stagger screws to opposite sides at every bearing surface.

D. Gypsum Board:

1. General:
 - a. During Winter Weather Installation periods, follow the GA-220 GYPSUM BOARD WINTER RELATED INSTALLATION RECOMMENDATIONS.

2. Install in accordance with CBC Chapter 25, DITF and GA recommendations, gypsum board panel manufacturer's written recommendations and in accordance with fire-rated design numbers.
 - a. At Ceilings and Soffits:
 - 1) At gypsum board ceilings and soffit areas, install the ceiling prior to installing the walls.
 - 2) Float the interior ceiling angles, and where permitted by code,
 - b. At Water Resistant Walls:
 - 1) Install where scheduled and in all areas where high moisture conditions are present, or ceramic tile, or wall coverings are scheduled over gypsum board.
 - 2) In all areas to be tiled, treat all edges, cutouts, utility holes and joints, corners and nailheads with an approved sealant material in lieu of standard taping. Joints not to be covered by tile shall be treated as regular gypsum board. Do not use standard joint compound under ceramic tile.
 3. Install gypsum board panels horizontally on walls, floor to ceiling.
 4. At metal frames terminate wall board panel edge inside frame. Do not terminate gypsum board panel edge against metal frame trim unless otherwise indicated.
- E. Cutting:
1. Cut gypsum board panels by scoring and breaking or by sawing, working from the face side.
 - a. When cutting by scoring, cut through the face paper and then snap the panel back away from the cut face; then break the backpaper by snapping the panel in the reverse direction or by cutting the back paper.
 2. Smooth all cut ends and edges of panels as necessary to obtain a smooth joint.
 3. For cut-outs in panels for pipes, fixtures, and other small openings, make holes and cut-outs by sawing or by such other method as will not fracture the core or tear the covering and with such accuracy that plates, escutcheons, or trim will cover the edges.
 4. The use of "score-and-knockout" method will not be permitted.
- F. Metal Accessories:
1. Corner Beads:
 - a. Install at all corners with galvanized screws at nine (9) inch intervals in both flanges with fasteners placed opposite one another the full length of the corner bead. Clinch-on fastening is not allowed.
 - 1) Fasteners shall be driven below the anticipated finished joint compound surface.
 - b. Install in one piece except when length of corner exceeds stock lengths – then put splice up high away from people traffic.
 2. Edge Trim: Install at all exposed joints where gypsum board panels abut another material with galvanized screws at nine (9) inch intervals the full length of the edge trim. Clinch-on fastening is not allowed.
 - a. Fasteners shall be driven below the anticipated finished joint compound surface.
 - b. Provide joint sealer in accordance with Specification Section -- SEALANTS.
 - 1) Provide fire sealant in accordance with Specification Section -- FIRSTOPPING or Specification Section -- SEALANTS, when the wall or ceiling is part of a fire-rated situation.
 3. Control Joints:
 - a. Install at 30'-0" o.c. maximum at all interior walls or partitions with uninterrupted planes that exceed 30' in length.

- 1) Opening frames that are full height of wall or partition may be considered a control joint.
 - b. Install at 50'-0" o.c. maximum at all interior ceilings and shall not exceed 2,500 sq.ft. in total area with perimeter relief.
 - c. Install at 30'-0" o.c. maximum at all interior ceilings and shall not exceed 900 sq.ft. in total area without perimeter relief.
- G. Fastening:
1. Properly space all fasteners in careful accordance with the manufacturer's written recommendations and code requirements, with heads driven slightly below the surface for proper cementing, but without breaking the paper face.
 2. Loosely butt all joints to be taped; firmly butt all joints to be left untreated.
 3. Stagger all end joints and the joints between panels to achieve a maximum of bridging and a minimum of continued joints.
- H. Taping and Finishing:
1. First Coat:
 - a. Spread compound evenly over all joints, using suitable tools designed for the purpose.
 - b. Fill all joint recesses and metal trim.
 - c. Center the reinforcing tape on the joint and press into the fresh compound at all joints, wiping down with sufficient pressure to remove excess compound but leaving sufficient compound under the tape for proper bond.
 - d. Feather all edges and leave the surface free from blisters and tape wrinkles.
 - e. Apply compound to all fastener recesses, leaving flush with the adjacent surfaces.
 - f. Fold reinforcing tape along its centerline and apply to all interior angles, following the same procedure as for joints.
 - g. Surfaces shall be free of excess joint compound.
 2. Second Coat:
 - a. Lightly sand the dry compound with fine sandpaper to remove all irregularities.
 - b. Apply a second coat of compound to all joints, feathering approximately three inches beyond edges of tape.
 - c. Apply second coat to all fastener recesses.
 - d. Surfaces shall be free of excess joint compound.
 3. Third Coat:
 - a. Lightly sand the dry compound with fine sandpaper to remove irregularities.
 - b. Apply final skim coat, feathering out approximately two inches beyond second coat.
 - c. Third coat all fastener recesses and metal trim, and all interior angles; allow to dry.
 - d. Surfaces shall be free of excess joint compound.
- I. Prep. Coat (Drywall Primer):
1. Apply Prep. Coat material at approximately 200 sq.ft. per gallon for all painted wall surfaces. Follow manufacturer's written recommendations for proper preparation of material, mixing and installation at recommended minimum coverage rates.
 - a. For smooth walls with no texture, provide airless sprayer application in accordance with manufacturer's written recommendations.
 - 1) Fine finish: Sand wall surface with 220 grit mesh screen after application of Prep. Coat. **Do not oversand!**

- b. For textured walls: Provide roller application with a 3/8" to 1/2" nap roller before texture application is applied in accordance with manufacturer's written recommendations.

J. Primer - Surfacer:

- 1. Apply Primer - Surfacer material at manufacturer's written recommendations for proper preparation of material, mixing and installation, and at recommended minimum coverage rates.
 - a. For smooth walls with no texture, provide airless sprayer application in accordance with manufacturer's written recommendations.
 - 1) Fine finish: Sand wall surface with 220 grit mesh screen after application of Primer - Surfacer. **Do not oversand!**
 - b. For textured walls: Provide roller application with a 3/8" to 1/2" nap roller before texture application is applied in accordance with manufacturer's written recommendations.

- K. Textured Finish Coats: After taping and finishing, apply Textured Finish Coats as indicated in the schedule at the end of this Specification Section.

3.4 FIELD QUALITY CONTROL

A. Site Tests:

- 1. Testing Agency: The Owner's Testing Laboratory Agency shall perform field tests and Inspections and prepare test reports.
 - a. Testing and inspecting of completed installations of suspended gypsum board ceiling fasteners and anchors shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with installations of gypsum board ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
- 2. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed:
 - a. Concrete Anchors:
 - 1) Must be capable of sustaining, without failure, a load equal to 200 lbs. tension for hanger wires and 440 lbs. tension for bracing wires by construction as determined by testing according to ASTM E 488 "Test Methods for Strength of Anchors in Concrete and Masonry Elements," by a qualified independent testing agency.
 - a) Hanger Wire Anchors 1 in 10 must be field tested.
 - b) Bracing Wire Anchors 1 in 2 must be field tested.
- 3. Remove and replace gypsum board ceiling hangers where test results indicate that they do not comply with specified requirements.
- 4. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 - a. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors of previously tested until 20 pass consecutively and then will resume initial testing frequency.

B. Inspection:

- 1. As required by Regulatory Requirements.

2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.

3.5 CLEANING

- A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
 1. Clean any soiled surfaces immediately.
 2. Clean any soiled surfaces at the end of each day, minimum.
 3. Finish shall be clean and ready for the application of any additional finishes.
 4. In accordance with manufacturer's written instructions and recommendations.

3.6 PROTECTION

- A. Protection from weather:
 1. Protect newly installed work from moisture after installation.
- B. Protection from traffic:
 1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.7 SCHEDULES

- A. The following textured finish coat finishes shall be applied to the board surfaces within the scope of this section prior to covering with other finish materials.
 1. Refer to the Material and Finish Schedule for specific locations of each substrate finish.
 2. Where no specific substrate finish is called for on the drawings, select the appropriate level of substrate finish from the descriptions below for the final finish material.
 3. Where no determination can be made from the descriptions below, provide a minimum of GB-2 substrate finish.
 4. Where sound, smoke control or fire-ratings are required, details of construction shall be in accordance with reports of tested assemblies meeting the requirements.
- B. GB-1 - Architect's Finish Designation:
 1. Level 5 - GYPSUM ASSOCIATION'S LEVEL OF GYPSUM BOARD FINISH:
 - a. All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. A thin skim coat of joint compound or a material manufactured especially for this purpose, shall be applied to the entire surface. The surface shall be smooth and free of tool marks and ridges.
 - b. Architect's Finish:
 - 1) Uniformly smooth and ready to receive Large Format Tiles, light grade wallcoverings, or fine textured finishes, or flat, semi-gloss, or gloss paints over flat surfaces.
 - 2) Use "Fog and Splatter" fine textured finish where walls and ceilings are scheduled to be painted, unless otherwise noted.

- C. GB-2 - Architect's Finish Designation:
1. Level 4 - GYPSUM ASSOCIATION'S LEVEL OF GYSPSUM BOARD FINISH:
 - a. All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound surfaces shall be smooth and free of tool marks and ridges.
 - b. Architect's Finish:
 - 1) Uniformly smooth and ready to receive light textures ("Spray-Splatter," "Orange Peel" (light or heavy) "Stipple" or "Skip Trowel" finishes), or medium grade wall-coverings.
 - 2) Use "Orange Peel" light texture finish when walls and ceilings are scheduled to be painted, unless otherwise noted.
- D. GB-3 - Architect's Finish Designation:
1. Level 2 - GYPSUM ASSOCIATION'S LEVEL OF GYSPSUM BOARD FINISH:
 - a. All joints and interior angles shall have tape embedded in joint compound and wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles. Fastener heads and accessories shall be covered with a coat of joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable. Joint compound applied over the body of the tape at the time of tape embedment shall be considered a separate coat of joint compound and shall satisfy the conditions of this level.
 - b. Architect's Finish:
 - 1) Total surface must be sufficiently smooth to create a good bonding plane acceptable for installation of scheduled materials (ceramic tile, plywood, acoustical tile or similar materials).
- E. GB-4 - Architect's Finish Designation:
1. Level 3 - GYPSUM ASSOCIATION'S LEVEL OF GYSPSUM BOARD FINISH:
 - a. All joints and interior angles shall have tape embedded in joint compound and one additional coat of joint compound applied over all joints and interior angles. Fastener heads and accessories shall be covered with two separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges.
 - b. Architect's Finish:
 - 1) Uniformly smooth and ready to receive heavy grade wallcoverings or medium heavy texture finishes (spray or hand applied).
 - 2) Use medium textured finishes where walls and ceilings are scheduled to be painted, unless otherwise noted.
- F. GB-5 - Architect's Finish Designation:
1. Level 1 - GYPSUM ASSOCIATION'S LEVEL OF GYSPSUM BOARD FINISH:
 - a. All joints and interior angles shall have tape set in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.
 - b. Architect's Finish:
 - 1) No applied texture. Use at areas that are above finished ceilings, in attics, in areas where the assembly would generally be concealed.
- G. GB-6 - Architect's Finish Designation:
1. Level 0 - GYPSUM ASSOCIATION'S LEVEL OF GYSPSUM BOARD FINISH:
 - a. No taping, finishing, or accessories required.

- b. Architect's Finish:
 - 2. Intended for "Temporary Partitions" and not for permanent construction. Not suitable for Fire-resistive construction.
- H. Non-rated wall signage:
- 1. Provide identification on both sides of all non-rated, fire-rated, and area separation walls with 3" high stenciled letters above ceiling line and no further than 30' from the adjacent identification symbol. Intersecting walls with different ratings shall be identified 5' from such intersection. All identification symbols shall be visible without the aid of a ladder or other similar devices. Colors listed below are from PPG/ICI's "DEV-GUARD" 4208 Series Industrial Interior Enamel line.
 - a. **IDENTIFICATION COLOR OF IDENTIFICATION**
 - b. Non-Rated Wall Semi-Gloss Black

END OF SECTION

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SECTION 093000 - TILE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install all tile materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 03 30 00 CAST-IN-PLACE CONCRETE
 4. 04 22 00 CONCRETE MASONRY UNITS
 5. 06 10 00 ROUGH CARPENTRY
 6. 07 18 50 VAPOR-ALKALINITY CONTROL
 7. 07 92 00 SEALANTS
 8. 08 31 13 ACCESS DOORS AND FRAMES
 9. 09 22 16 METAL FRAMING
 10. 09 24 00 CEMENT PLASTER
 11. 09 29 00 GYPSUM BOARD
 12. 10 21 13 TOILET PARTITIONS
 13. 10 28 13 TOILET ACCESSORIES
 14. 11 40 00 FOOD SERVICE EQUIPMENT
 15. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

- A. Standards:
1. In accordance with the following standards:
 - a. ADAAG Americans with Disabilities Act Accessibilities Guidelines
 - b. ADAS Americans with Disabilities Act Standards
 - c. ANSI American National Standards Institute, Specifications for the Installation of Ceramic Tile, latest edition, unless otherwise indicated.
 - d. FDA Food and Drug Administration
 - e. TCNA Tile Council of North America "Handbook for Ceramic Tile Installation"

1.3 DEFINITIONS

- A. Definitions shall comply with the latest edition of the TCNA "Handbook for Ceramic Tile Installation."
1. MOH's: Relative Measure of Hardness by scratching the surface of the tile with different minerals and subjectively assigning a "MOH's Scale Hardness" number to the glaze.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data:
 - a. For each type of Tile indicated.
 - b. Manufacturer's full color range (including any standard and premium colors).
 - c. Design Data for components, fillers, adhesives, etc.
 2. Shop Drawings:
 - a. Location of all movement/expansion joints.
 3. Samples:
 - a. 12 inch square sample of each color and pattern selected.
 - b. 6 inch lineal samples of each piece of trim material specified.
 4. Quality Assurance/Control Submittals:
 - a. Test Reports:
 - 1) From Manufacturer that all floor tile complies with the slip resistance standards recommended by the ADAAG/ADAS.
 - b. Certificates:
 - 1) Provide TCNA Master Grade Certificate.
 - c. Manufacturer's Written Installation Instructions.
 - d. Statement of Installer's Qualifications.
 5. Closeout Submittals in accordance with the following:
 - a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - b. Warranty in accordance with this specification, and with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

- A. Qualifications:
1. Material Qualifications:
 - a. Tile Grade: Standard Grade in accordance with ANSI A 137.1x.
 - b. Tile shall meet the Breaking Strength limits listed in accordance with ASTM C 648 "Test Method for Breaking Strength of Ceramic Tile."
 - c. Tile shall meet the Scratch Hardness limits in accordance with MOH's
 - d. TCNA Master Grade Certificate signed by tile manufacturer and tile installer.
 2. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
- B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. CBC California Building Code (CBC 804.1)

- C. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
 - c. Review delivery, storage, and handling procedures.
 - d. Review Project Conditions.
 - e. Review subfloor preparation procedures.
 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
1. Products shall be handled in such a manner as to assure that they are free from dents, chips, scratches and other damage.
- B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
 2. Damaged products will not be accepted.
- C. Storage and protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 PROJECT CONDITIONS

- A. Environmental requirements:
1. Temperature:
 - a. Maintain temperature in space to receive ceramic tile above 50 degrees F for 3 days prior, during, and 7 days following installation.
- B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
 2. Field Measurements:

- a. Take and be responsible for field measurements as required.
- b. Report any significant differences between field dimensions and drawings to the Architect.

1.8 WARRANTY

- A. Contractor's General Warranty:
 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 1. In accordance with manufacturer's written standard warranty,
 2. Warranty Period shall be for the following:
 - a. Interior Ceramic Tile One (1) Year.
 - b. Exterior Ceramic Tile One (1) Year.
- C. Installer's Warranty:
 1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period: One (1) Year.

1.9 MAINTENANCE

- A. Extra Materials:
 1. Maintenance Material:
 - a. In accordance with Specification Section - PROJECT CLOSEOUT.
 - b. Supply 2 square feet of tile and 3 lineal feet of trim for each color and pattern of tile

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 1. Interior Ceramic Tile manufacturer:
 2. Exterior Accent Ceramic Tile manufacturer:
 - a. DALTILE.
 3. Grout Materials manufacturer:
 - a. MAPEI.
 - b. Acceptable alternative manufacturers:
 - 1) CUSTOM BUILDING PRODUCTS, INC.
 - 2) LATICRETE.
 4. Mortar Materials manufacturer:
 - a. MAPEI.

- b. Acceptable alternative manufacturers:
 - 1) CUSTOM BUILDING PRODUCTS, INC.
 - 2) LATICRETE.
- 5. Admixture manufacturer:
 - a. MAPEI "Plancrete AC."
- 6. Membranes manufacturer:
 - a. THE NOBLE COMPANY.
 - b. Acceptable alternative manufacturers:
 - 1) DALTILE.
 - 2) INTERCERAMIC
- 7. Sealer manufacturer:
 - a. CUSTOM BUILDING PRODUCTS Tile Lab "Surface Gard Penetrating Sealer"
 - 1) Acceptable alternative manufacturers:
 - a) C-CURE "Penetrating Sealer #978"

- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. General:
 - 1. Slip Resistance:
 - a. Level Surfaces:
 - 1) Static Coefficient of Friction (SCOF): Tile installed on level walkway surfaces shall be slip resistant by achieving a minimum 0.6 or greater static coefficient of friction as recommended in Appendix A4.5 of the ADAAG by testing per ASTM C 1028 "Test method for Static Coefficient of Friction of Ceramic Tile and Like Surfaces by the Horizontal Dynamometer Pull Meter Method."
 - 2) Dynamic Coefficient of Friction (DCOF): Tile installed on level walkway surfaces shall be slip resistant by achieving a minimum 0.42 or greater dynamic coefficient of friction as recommended in ADAS per TCNA technical bulletin "Coefficient of Friction and the DCOF AcuTest," by testing per ANSI A 137.1 "American National Standard Specifications for Ceramic Tile," section 9.6 "Procedure for Dynamic Coefficient of Friction (DCOF) Testing."
 - 2. Colors and patterns shall be selected from manufacturer's standard line (including premium), except as noted otherwise.
- B. Ceramic:
 - 1. Exterior "Accent" Wall Tile: **CT-4.**
 - a. Manufacturer: DALTILE.
 - 1) Natural Hues (2) Glazed ceramic tiles on Eco-Body.
 - 2) Trim to match.
 - a) Tile Trim Units: Provide tile trim units (i.e. "bullnoses," "thin-set bullnoses," "coves," "thin-lip bases," "round top bases," "beads," and "countertop edge trims" as is appropriate to tile types) to match characteristics of adjoining flat tile.
 - b. Design: 4 inch x 4 inch x 5/16" thick.

- c. Pattern: Single size tile pattern.
 - 1) Refer to drawings for tile pattern
 - 2) Grout joint width: 1/4".
- d. Color: Refer to Exterior Color Schedule.
- e. Material: Exterior Glazed Ceramic.
 - 1) Moisture Absorption Rate: < 6.0%.
 - 2) Breaking Strength: Exceeds ANSI A 137.1, Sec. 6.3.

C. Setting Bed:

- 1. Thick-Set:
 - a. Portland Cement: In accordance with ASTM C 150 " Specification for Portland Cement• , " Type 1.
 - b. Sand (Aggregate): In accordance with ASTM C 144 " Standard Specification for Aggregate for Masonry Mortar."
 - c. Hydrated Lime: In accordance with ASTM C 207 "Specification for Hydrated Lime for Masonry Purposes.," Type S.
 - d. Admixture: Shall be Mortar Latex Admix "Planicrete AC" as manufactured by MAPEI, or approved equivalent.
 - 1) This Admixture serves as a replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.
- 2. Thin-Set:
 - a. Dry-Set Portland Cement Mortar: In accordance with ANSI A 118.1-1999.
 - 1) Shall be "Kerabond" by MAPEI, or approved equivalent for floor and wall surfaces.
 - a) For wall applications, provide non-sagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.
 - b. Modified Dry-Set Cement Mortar: In accordance with A118.4TE, A118.15TE and A118.11
 - 1) Shall be "Large Floor Tile Mortar" by MAPEI, or approved equivalent.
 - a) Approved Equivalent: 'ProLite Premium Large Format Tile Mortar' by CUSTOM BUILDING PRODUCTS.
 - 2) For floor applications in which the long edge of tile exceeds 8" (large format tiles).
 - c. Latex-Portland Cement Mortar: In accordance with ANSI A 118.4-1999.
 - 1) Shall be "Keralastic" + "Kerabond" by MAPEI, or approved equivalent for floor and wall masonry or floor and wall concrete surfaces.
 - a) For wall applications, provide non-sagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.

D. Grout:

- 1. Cement:
 - a. ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce color indicated.
- 2. Commercial Cement:
 - a. ANSI A118.6, composed of Standard Sanded Cement Grout, color as indicated.
- 3. Silicone-Rubber:

- a. One-part, chemically curing, silicone-rubber-based elastomeric sealants used for factory-grouted joints within pre-grouted sheets of glazed wall tile and for field-grouted joints between the same pre-grouted sheet
 - 1) Silicone-Rubber grout shall not be used on kitchen countertops or other food preparation surfaces unless it meets the requirements of FDA Regulation No. 21, CFE 177.2600.
4. Dry-Set:
 - a. ANSI A 108.5-1999 and ANSI A 118.1-1999, a mixture of Portland Cement with sand and additives, color as indicated.
5. Epoxy:
 - a. ANSI A118.3-1999, Chemical-Resistant, Water-Cleanable, Ceramic Tile-Setting and Grouting Epoxy, color as indicated.

2.3 ACCESSORIES

A. Membranes:

1. Wall:
 - a. Polyethylene, 4 mil sheet with 6 inch laps at wet areas.
 - b. Polyethylene, 6 mil sheet with 6 inch laps at shower areas adjacent to concrete or masonry wall areas.
2. Floor:
 - a. Mortar bed: Nonplasticized, chlorinated polyethylene sheet faced on both sides with nonwoven polyester fabric; 0.040 inch nominal thickness, water vapor transmission rate 0.040 perms per ASTM E 96 "Test Methods for Water Transmission of Materials," Procedure E.
 - 1) "Chloraloy" by THE NOBLE COMPANY.
 - b. Thin-Set: Nonplasticized, chlorinated polyethylene sheet faced on both sides with nonwoven polyester fabric; 0.030 inch nominal thickness, water vapor transmission rate 0.15 perms per ASTM E 96 "Test Methods for Water Transmission of Materials," Procedure E.
 - 1) "Nobleseal TS" by THE NOBLE COMPANY.
 - 2) Approved equivalent: "Dal-Seal CIS" by DAL TILE over a skim coat of "Keralastic" + "Kerabond" by MAPEI.

B. Miscellaneous Materials:

1. Provide miscellaneous guides, shims, spacers, rust resistant fasteners, etc., applicable to substrates and finish materials necessary for flat and true surfaces that minimize cracks, bulges and uneven surfaces.

C. Cleaners:

1. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

D. Sealers:

1. Grout and Tile Sealer: Manufacturer's standard product for sealing grout joints and tile surfaces that does not change color or appearance of grout or tile.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
- C. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Coordination:
 - 1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
 - 2. Prior to installation of Tile, inspect the installed work executed under other Sections which affect the installation of Tile.
 - a. Prepare masonry surfaces with a parge coat and cure so that all surfaces are flat prior to the installation of tile.
- B. Protection:
 - 1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
- C. Surface preparation:
 - 1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
 - 2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3. Fill cracks, holes, and depressions in concrete substrates for tile floors with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
 4. Maximum backing surface variations shall be as follows:
 - a. Mortar Bed at Floors: 1/4 inch in 10 feet from required plane.
- D. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.
5. Determine location of all movement/expansion joints before starting tile work.
6. Install Cementitious Backer Units in accordance with Cementitious Backer Unit Board Manufacturer's recommendations.
 - a. Shim Cementitious Backer Unit Boards as required for a flat and true surface plane with no bulges or uneven or flared surfaces.
 - b. Set shims at fasteners.
 - c. Fasten with corrosion resistant, waferhead, self-drilling screws with countersinking ribs, min. 8 gauge. Set flush with Board's surface. Fasten thru shims.
7. Determine location of all toilet accessories before starting tile work.
8. Isolate tile installations from concrete slabs at shower floor areas to minimize cracking of the tile installation systems. Install in accordance with the TCNA recommendations using cleavage membranes.
 - a. Provide crack isolation membranes as required in accordance with TCNA installation requirements.
9. Provide wall membranes as required by TCNA installation requirements.

B. Layout:

1. Lines shall be straight and true.
2. Refer to Wall and Floor Pattern Drawing(s) in the Interior and Exterior Color Schedules for layout of patterns.
3. Lay out all tile work to minimize cuts less than one-half in size.
4. Lay out tile wainscots to next full tile beyond dimension shown.

C. Joints

1. General: Movement/Expansion Joints shall be placed in accordance with the TCNA recommendations for placement.
2. Align all wall joints to give straight uniform grout lines, plumb and level.
3. Align all floor joints to give straight uniform grout lines, parallel with walls.
4. All joints shall be uniform in width.
5. Locate expansion joints in the tilework:
 - a. Over construction or expansion joints in the backing.
 - b. Where backing materials change or change directions.

- c. At wall/floor intersections.
 - d. Exterior work:
 - 1) Not more than 8 - 12 feet in each direction.
 - e. Interior work:
 - 1) Not more than 20 - 25 feet in each direction.
 - a) Interior tilework exposed to direct sunlight or moisture: 8 to 12 feet in each direction.
 - b) Above ground concrete slab substrate: 8 to 12 feet in each direction.
6. Movement/expansion joint width sizes:
- a. Working Butt Joints 1/4 inch minimum.
 - b. Working Lap Joints 1/8 inch minimum.
- D. Flatness and Lippage:
- 1. Maximum lippage between adjacent units: 1/32 inch.
- E. Tile System Installations:
- 1. Exterior Wall:
 - a. System EWA: Masonry or Concrete Walls, 3/4" to 1" mortar bed installation
SYS-EWA.
 - 1) Use: Dry or Wet Exposure.
 - 2) Method: Cement Mortar.
 - 3) Detail Standard: TCNA W201 - Wall Membrane, Metal Lath, 3/4" To 1" Scratch Coat/Mortar Bed, Bond Coat, Tile, Grout.
 - 4) Installation Standard:
 - a) Waterproof Membrane ANSI A108.13.
 - b) Tile ANSI A 108.1B.
 - c) Grout ANSI A 108.10.
 - b. System EWB: Solid Backing Walls, 3/8" to 3/4" reinforced mortar bed
SYS-EWB.
 - 1) Use: Dry or Wet Exposure.
 - 2) Method: Cement Mortar.
 - 3) Detail Standard: TCNA W221 - Wall Membrane, Metal Lath, 3/8" To 3/4" Scratch Coat/Mortar Bed, Bond Coat, Tile, Grout.
 - 4) Installation Standard:
 - a) Waterproof Membrane ANSI A108.13.
 - b) Tile ANSI A 108.1A, 1B, or 1C A108.1B is required if waterproof membrane or epoxy bond coat is to be used.
 - c) Grout ANSI A 108.10.
 - c. System EWC: Metal Stud Walls, 3/4" to 1" mortar bed, exterior walls
SYS-EWC.
 - 1) Use: Dry or Wet Exposure.
 - 2) Method: Cement Mortar.
 - 3) Detail Standard: TCNA W241 - Wall Membrane, Metal Lath, 3/4" To 1" Scratch Coat/Mortar Bed.
 - a) At exterior Tile locations include: Bond Coat, Tile, Grout.
 - 4) Installation Standard:
 - a) Waterproof Membrane ANSI A108.13.
 - b) Tile ANSI A 108.1A, 1B, or 1C A108.1B is required if waterproof membrane or epoxy bond coat is to be used.
 - c) Grout ANSI A 108.10.
 - 2. Sealer Application:

- a. For tile and grout sealers, follow manufacturer's written recommendations and procedures, at application rates recommended by the label on the material container.
- b. Apply penetrating grout sealer and cure in accordance with tile manufacturer's written recommendations for the resistance of moisture penetration into the grout surface.
- c. For Stone Tile and Stone Grout sealers, apply at a rate of 500 to 1,500 sq. ft. per coat per gallon, depending on type of stone (slate), porosity and texture of the surface, temperature, humidity and method of application.
- d. For exterior Stone Tile applications, provide two coats of sealer per manufacturer's written recommended rate of application, allowing the proper time between coats for curing (30 minutes) as recommended by the manufacturer.
 - 1) Protect newly coated surface from traffic and moisture for a period of twelve hours.

F. Curing:

1. Apply Curing Sheet over all tiled surfaces.
 - a. Lap sheets 4 inches minimum and seal against escape of moisture.
 - b. Leave Curing Sheets in place a minimum of 3 days.

3.4 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.

1. Clean any soiled surfaces immediately.
2. Finish shall be clean and ready for the application of any additional finishes.
3. In accordance with manufacturer's written instructions and recommendations.
4. Wash down cured tile work with cleaner mixed and applied in accordance with manufacturer's written instructions.
5. Rinse tile-work thoroughly, with clean water, and polish with soft-cloth.

B. Cleaning, Removal, Replacement and Repointing of Existing Tile:

1. Clean all existing tile and grout of all dirt, oils and graffiti.
2. Remove all existing tile which has been damaged, cracked, drilled, or otherwise disfigured from its original shape and installation (including Graffiti which can not be cleaned off).
 - a. Provide in the Base Bid for an ALLOWANCE of 100 sq. ft. maximum of tile areas selected by the Architect (excluding expected tile replacement for blocking or new walls) for additional work required to complete the modernization.
3. Repoint all grout conditions subject to tile removal and replacement, and repoint all grout conditions where the existing grout has been damaged, cracked, drilled, or otherwise disfigured from its original shape and installation. Repoint with Latex-Portland Cement Mortar.
4. Install new tile in locations subject to tile removal. Install tile colors (maximum of 4 color choices) in locations selected by the Inspector and Architect.

3.5 PROTECTION

A. Protection from weather:

1. Protect newly installed work from freezing for 24 hours after erection, installation or application.

- B. Protection from traffic:
1. Prohibit all foot and wheel traffic from using newly tiled floor for at least 3 days.
 2. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 096510 – RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all Resilient Base and Accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 30 00 CAST-IN-PLACE CONCRETE
 - 4. 03 35 10 POLISHED CONCRETE FINISHING
 - 5. 04 20 00 CONCRETE MASONRY UNITS
 - 6. 06 10 00 ROUGH CARPENTRY
 - 7. 06 41 23 MODULAR CASEWORK
 - 8. 09 24 00 CEMENT PLASTER
 - 9. 09 29 00 GYPSUM BOARD
 - 10. 09 72 00 WALL COVERINGS
 - 11. 09 91 00 PAINTING
 - 12. 10 05 00 MISCELLANEOUS SPECIALTIES
 - 13. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

- A. Standards:
 - 1. In accordance with Specification Section - Regulatory Requirements, and the following standards:
 - a. ADAAG Americans with Disabilities Act Accessibilities Guidelines.
 - b. RFCI The Resilient Floor Covering Institute.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 - 1. Product Data:
 - a. For each type of resilient base and accessory indicated.
 - b. Manufacturer's full color range (including any standard and premium colors).
 - c. Design Data for all compounds, fillers, adhesives, etc.
 - 2. Samples.
 - a. Provide 6 inch linear samples of each piece of trim material specified.
 - 3. Quality Assurance/Control Submittals:
 - a. Manufacturer's Written Installation Instructions.

- b. Certificate from resilient base installer that all products supplied for installation comply with local CARB regulations in the area where the project is located controlling the use of Volatile Organic Compounds (VOC's).
- c. Statement of Installer's Qualifications.
- 4. Closeout Submittals in accordance with Specification Sections in Division One:
 - a. Maintenance Data (including recommended polish and buffing procedures) in accordance with Specification Section - PROJECT CLOSEOUT.
 - b. Record Documents in accordance with Specification Section – PROJECT DOCUMENTS.
 - c. Warranty in accordance with this Specification Section, and Specification Section – WARRANTIES.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project, and is competent in the techniques required by the manufacturer.
 - 2. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
- B. Regulatory Requirements:
 - 1. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA) in the area where the project is located.
 - 2. CBC California Building Code (CBC 804.1)
- C. Meetings:
 - 1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
 - c. Review delivery, storage, and handling procedures.
 - d. Review Project Conditions.
 - e. Review subfloor preparation procedures.
 - 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
 - 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 - 1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
- B. Acceptance at Site:
 - 1. Products must be in manufacturer's original unopened containers with labels indicating brand name, type, color, and size.
 - 2. Damaged products will not be accepted.
- C. Storage and protection:
 - 1. Products shall be stored in a dry, protected, interior area above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.
 - b. Maintain temperature in the storage space between fifty (50) degrees Fahrenheit and ninety (90) degrees Fahrenheit.
 - 1) Seven (7) days prior to installation, acclimate products to environmental requirements of the article titled PROJECT CONDITIONS of this specification section, and the Paragraph titled "Environmental Requirements."

1.6 PROJECT CONDITIONS

- A. Environmental requirements:
 - 1. Temperature: Maintain temperature in space to receive products at sixty-eight (68) degrees Fahrenheit for two (2) days prior, during, and two (2) days following installation.
 - a. After this period, maintain a temperature of not less than fifty-five (55) degrees Fahrenheit.
 - b. After installation, at no such time shall the temperature exceed eighty-five (85) degrees Fahrenheit.
- B. Existing Conditions:
 - 1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
 - 2. Field Measurements:
 - a. Take and be responsible for field measurements as required.
 - b. Report any significant differences between field dimensions and drawings to the Architect.

1.7 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section - WARRANTIES.

- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Rubber Base Two (2) Years.
 - b. Transitions Two (2) years.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty Period Two (2) Years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Rubber Base manufacturer:
 - a. MANNINGTON COMMERCIAL.
 - b. Acceptable alternative manufacturers:
 - 1) ROPPE CORPORATION.
 - 2. Transitions manufacturer:
 - a. MANNINGTON COMMERCIAL.
 - b. Acceptable alternative manufacturers:
 - 1) ROPPE CORPORATION.
 - 3. Underlayment Compound manufacturer:
 - a. ARDEX INCORPORATED.
 - b. Acceptable alternative manufacturers:
 - 1) CHEMREX.
 - a) A compatible bonding agent is needed for this product to adhere to the Vapor-Alkalinity Control System and be considered as equivalent.
 - 4. Crack and Joint Filler manufacturer:
 - a. ARDEX INCORPORATED.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. General:
 - 1. Resilient base and accessories shall be of first quality and the product of one manufacturer.
 - 2. Colors and patterns shall be selected from manufacturer's standard line (including premium) except as noted otherwise.

3. All resilient base and accessories shall be impervious to water damage.

B. Rubber Base:

1. Shall comply with ASTM F 1861 "Standard Specification for Resilient Wall Base," for Type TS (Vulcanized Rubber), Group 1 (Solid and Homogeneous).
 - a. Critical Radiant Flux shall be Class 1, not less than 0.45 W/sq.cm. per ASTM E 648 "Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source."
2. Base shall be Coved.
3. Base height shall be 6".
4. Thickness shall be 0.125".
5. Provide pre-formed inside and outside base corners from the same dye lot as the rubber base.

2.3 ACCESSORIES

A. Underlayment Compound:

1. Provide free-flowing, self-leveling, pumpable, cement based compound (ARDEX K-15) for applications from 1 inch thick to feathered edges, 4000 psi minimum in accordance with ASTM C 109-modified for air cure only "Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens)."
 - a. ARDEX "K-15."

B. Crack and Joint Filler:

1. Provide low viscosity rigid polyurethane filler, tensile strength of 4,000 psi minimum, in accordance with ASTM D 638 "Test method for Tensile Properties of Plastics."
 - a. ARDEX "ARDIFIX".

C. Concrete Primer (if applicable):

1. Nonstaining type as recommended in writing by flooring manufacturer.

D. Adhesives:

1. Adhesive as recommended in writing by resilient base manufacturer.
 - a. Provide manufacturer's written recommended epoxy adhesive at all rubber stair accessories and rubber stair nosings.
2. Compatible with Vapor-Alkalinity Control System, if installed.
3. Shall comply with CARB requirements in the place where the project is located.
4. Shall be water and mildew resistant.
5. Shall bond to non-porous substrate surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affect the execution of work under this specification section.

2. Insure that all flooring has been installed, fitted close to the wall to provide even support to the resilient base, and to insure a tight, smooth fit along the floor.
3. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
4. Execution of work under this specification section shall constitute acceptance of existing conditions.

B. Concrete Subfloors:

1. Verify that concrete slabs comply with ASTM F 710 "Practice for Preparing Concrete Floors to Receive Resilient Flooring."
2. Verify that substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond.
3. Verify that subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
4. Evaluate the RH (Relative Humidity) and pH (Alkalinity) for compliance with adhesives and resilient tile manufacturer's written substrate preparation recommendations.
 - a. If a Vapor-Alkalinity Control System product has been installed to reduce water vapor emission or phosphates thereby negating the RH and pH Test Results, evaluate products for compatibility with adhesives and resilient base products.
5. Determine adhesion characteristics by performing bond tests recommended by the resilient base and accessory manufacturer.

3.2 PREPARATION

A. Coordination:

1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:

1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work.

C. Surface preparation:

1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Wall substrates to receive resilient base must be completely clean, dry, smooth and free of oil, grease, rust, paint, varnish, shellac, or any other foreign substance.
3. From floor substrates, remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that may contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by the resilient base and accessory manufacturer.
 - a. If a Vapor-Alkalinity Control System has been installed, do not remove this system.
4. Fill all cracks, joints, etc. with a Crack and Joint Filler according to manufacturer's written instructions.
5. Install self-leveling underlayment compound at depressed or uneven floor conditions.
6. Vacuum clean substrates to be covered immediately before installation.
7. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.
8. Proceed only after unsatisfactory conditions have been corrected.
9. Perform manufacturer recommended bond test to verify adhesion of resilient base and accessory to substrate.

10. Apply any recommended primers over the leveling compounds or treated concrete slabs prior to the installation of any resilient base or accessory products if recommended by the manufacturer.

3.3 INSTALLATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

B. Layout:

1. Lines shall be straight and true.
2. Refer to Floor Pattern Drawing(s) in the Interior Color Schedule for transitions in color.

C. Resilient Base installation:

1. For base installations on primed metal or enameled surfaces, provide manufacturer's written recommended co-adhesive method of installation applied to both surfaces with contact bond adhesive.
2. On dry, absorbent surfaces, the base shall be adhered with manufacturer's written recommended adhesive and firmly pressed to the walls.
3. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
4. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
5. Tightly adhere resilient base to substrate throughout length of piece, with base in continuous contact with horizontal and vertical substrates.
6. Do not stretch resilient base during installation.
7. On masonry surfaces, or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
8. Pre-molded Corners: Install pre-molded corners before installing straight pieces.
9. After the installation, remove all excess adhesive before it dries.
10. Allow adhesive to set firm for approximately 24 hours before washing or applying any pressure.

D. Transition installation:

1. Measure and trim to fit transition pieces prior to installing.
2. Use appropriate approved manufacturer written adhesives for each substrate.
3. After installation, immediately remove all excess adhesive before it dries.

3.4 CLEANING

A. Cleaning:

1. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
2. Clean any soiled surfaces immediately.
3. Clean any soiled surfaces at the end of each day, minimum.
4. Finish shall be clean and ready for the application of any additional finishes.
5. In accordance with manufacturer's written instructions and recommendations.

3.5 PROTECTION

A. Protection from traffic:

1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 097200 - WALL COVERINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all materials, labor, equipment and services necessary to furnish and install all Wall Coverings, accessories, and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.
 - a. FRP Panel systems.
 - b. Vinyl Covered Tackboard Panel systems.
 - c. Solid Surfacing.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 06 41 23 MODULAR CASEWORK
 4. 09 24 00 CEMENT PLASTER
 5. 09 29 00 GYPSUM BOARD
 6. 09 65 10 RESILIENT BASE AND ACCESSORIES
 7. 10 11 00 VISUAL DISPLAY BOARDS
 8. 10 26 00 WALL AND CORNER GUARDS
 9. 10 28 13 TOILET ACCESSORIES
 10. 10 44 00 FIRE PROTECTION SPECIALTIES
 11. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data.
 - a. Submit manufacturer's full color range (including any standard, premium and custom colors) of all Wall Coverings for selection by the Architect.
 2. Samples.
 - a. Provide 6 inch square sample of each Wall Covering product for color and pattern selected.
 - b. Provide 6 inch lineal samples of each Wall Covering trim material specified.
 3. Closeout Submittals in accordance with the following:
 - a. Warranty in accordance with Specification Section - WARRANTIES.

1.3 QUALITY ASSURANCE

- A. Qualifications:
1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

- b. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
- 2. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:

- 1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. CBC California Building Code (CBC 803.1.1).

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:

- 1. Products shall be individually wrapped.
- 2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:

- 1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
- 2. Damaged products will not be accepted.

C. Storage and protection:

- 1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.5 PROJECT CONDITIONS

A. Environmental requirements:

- 1. Temperature: Maintain ambient temperature in space to receive products between sixty (60) degrees Fahrenheit and eighty (80) degrees Fahrenheit for three (3) days prior, during, and three (3) days minimum following installation. Inform the Owner of ambient temperature requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.

B. Existing Conditions:

- 1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.6 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified FRP Panel product manufacturer:
 - a. CRANE COMPOSITES with NUDO Aluminum Trim Accessories.
 - b. Acceptable alternative manufacturers:
 - 1) BP CHEMICALS with NUDO Aluminum Trim Accessories.
 - 2) MARLITE with NUDO Aluminum Trim Accessories.
 - 3) NUDO PRODUCTS, INC. with NUDO Aluminum Trim Accessories.
 - 2. Specified Vinyl Covered Tackboard product manufacturer:
 - a. CHATFIELD-CLARKE COMPANY, INC., a Divison of KOROSEAL WALLCOVERINGS, as distributed through WESTERN BUILDING MATERIALS.
 - b. Acceptable alternative manufacturers:
 - 1) KOROSEAL SCHOOL COLLECTION as manufactured by KOROSEAL WALLCOVERINGS, as distributed through WESTERN BUILDING MATERIALS.
 - 2) LAMVIN INC.
 - 3. Specified Solid Surface product manufacturer:
 - a. DUPONT CORIAN
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. FRP Panels:

1. Width 48 inches.
2. Thickness 0.090 inches.
3. Fire Rating in accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials" (Class C):
 - a. Flame Spread Maximum 175.
 - b. Smoke Developed Maximum 270.
4. Finish:
 - a. Pattern Linen Texture.
5. Color as selected from manufacturer's full color palette (including standard, premium and custom colors).
6. Accessories:
 - a. Adhesive as recommended in writing by manufacturer that meets the CARB requirements of the place where the Project is located.
 - b. Sealant.
 - 1) Set all perimeter J-Mold trim in a continuous bead of silicon sealant.
7. Aluminum Trim by NUDO PRODUCTS, INC.:
 - a. Provide inside, outside, division and edge trim moldings as required for the conditions present in the project.
 - b. Lengths 96 inches
 - c. Thickness 0.090 inch
 - d. Trim Shapes:
 - 1) J-Mold NUDO A-28.
 - 2) Divider NUDO A-30.
 - 3) Inside Corners NUDO A-32.
 - 4) Outside Corners NUDO A-34.
 - e. Finish: Powder Coated, in colors to match the field color of the FRP Panels.

B. Vinyl Covered Tackboard:

1. Tackboard Size: 1/2" x 48" wide by maximum practical height to minimize joints.
 - a. Wood fiber substrate tackboard shall be 1/2" thick, cellulose fiberboard sheathing, beveled side edges and square end edges, in accordance with ASTM C 208 "Specification for Cellulosic Fiber Insulating Board," complying with the minimum standards listed below:
 - 1) Weight, lb/1000 ft² 640.
 - 2) Transverse strength, lbf 14.5.
 - 3) Tensile Strength, lb/in² 242.
 - 4) MOR, lb/in² 380.
 - 5) "k" Factor 0.37.
 - 6) Maximum Flame Spread - Class B 75.
 - 7) Maximum Smoke Developed - Class B 175.
2. Finish: Architect to select from manufacturer's standard textures and colors from the following series: Koroseal School Collection.
 - a. Collection: Sonesta
 - b. All vinyls used are to be 20 oz. total weight per lineal yard with a cloth backer to insure consistent emboss.

- 1) Class A vinyls shall be tested in accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials," with the following maximum requirements:
 - a) Maximum Flame Spread - Class A 25.
 - b) Maximum Smoke Developed - Class A 5.
 3. Edge:
 - a. Beveled, long side edges with vinyl wrapped to back side. Short end edges to be square cut with vinyl flush with end of substrate board.
 4. Accessories:
 - a. Provide vinyl covered PVC moldings in the following configurations: edge, inside and outside corner, and intermediate splice moldings. Provide colors to match the field panels. Use of moldings and locations shall be indicated on the drawings.
 5. Overall panel when wrapped with Class A vinyls shall meet flame spread and smoke developed index approval in accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials," as follows:
 - a. Maximum Flame Spread - Class B 75.
 - b. Maximum Smoke Developed - Class B 175.
 6. Adhesive:
 - a. In accordance with tackboard panel manufacturer's written recommendations, and in compliance with CARB Standards and VOC requirements.
- C. Solid Surface
1. Wide sheet dimensions.
 2. Dimension: 60" wide x 98" high x 1/4" thick
 3. Color: As indicated on Interior Color Schedule
 4. Joints:
 - a. Hard seam joints at inside and outside corners. Refer to manufacturer installation for instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual, which affect the execution of work under this specification section.
 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
- B. Protection:

1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:

1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

B. Layout:

1. Lines shall be straight and true.

C. Solid Surface:

1. Install material in accordance with manufacturer's procedures and approved shop drawings.
2. Permanent Installation:
 - a. After verification of fit and finish, clean substrate; remove loose and foreign matter which may interfere with adhesion. Clean material backside and joints with denatured alcohol.
3. Vertical Surface:
 - a. Apply continuous bead of mounting adhesive around Perimeter. In addition, apply 1/8" 100% silicone adhesive bead every 8 inches on vertical center.
 - b. Install material over surface plumb, level, square and all on the same plane.
4. Joints:
 - a. Joints shall be flush, tight fitting, level and clean.
 - b. Hard seam joints per manufacturer instructions.

3.4 FIELD QUALITY CONTROL

A. Inspection:

1. As required by Regulatory Requirements.
2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.

1. Clean any soiled surfaces immediately.
2. Finish shall be clean and ready for the application of any additional finishes.

3. In accordance with manufacturer's written instructions and recommendations.

END OF SECTION

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SECTION 099100 - PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Provide all material, labor, equipment and services necessary to furnish and install Painting, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.
 - a. Material and Equipment to be Painted: Paint all piping, unwrapped ductwork, electric conduits exposed to view. Prime and paint all factory finished mechanical and electrical equipment and accessories exposed to view.
 - b. Material and Equipment not to be Painted: Do not paint piping, ductwork, equipment and machinery located in attic spaces, above furred or suspended ceilings, in furred pipe or duct spaces. Do not paint factory finished equipment or machinery located in mechanical rooms or mechanical buildings, attics, furred or suspended ceilings.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:

1. ALL DIVISION 00 SPECIFICATION SECTIONS.
2. ALL DIVISION 01 SPECIFICATION SECTIONS.
3. 04 22 00 CONCRETE MASONRY UNITS
4. 05 12 00 STEEL AND FABRICATIONS
5. 05 30 00 METAL DECK
6. 06 41 23 MODULAR CASEWORK
7. 07 41 13 METAL SHINGLES
8. 07 60 00 SHEET METAL (Shop Priming)
9. 07 72 00 ROOF ACCESSORIES
10. 07 92 00 SEALANTS
11. 08 31 13 ACCESS DOORS AND FRAMES
12. 08 33 00 COILING DOORS
13. 08 70 00 HARDWARE
14. 08 80 00 GLASS
15. 09 24 00 CEMENT PLASTER
16. 09 29 00 GYPSUM BOARD
17. 09 65 10 RESILIENT BASE AND ACCESSORIES
18. 10 05 00 MISCELLANEOUS SPECIALTIES
19. 10 21 13 TOILET PARTITIONS
20. 10 26 00 WALL AND CORNER GUARDS
21. 10 44 00 FIRE PROTECTION SPECIALTIES
22. 32 12 00 PAVEMENT
23. 32 19 19 ORNAMENTAL METAL
24. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:

1. In accordance with the following standards:
 - a. CA-CHPS California High Performance Schools

- 1) 2011-CA-CHPS Addendum.
- b. MPI Master Painters Institute
 - 1) MPI - Architectural Painting Specification Manual.
 - 2) MPI – Maintenance Repainting Manual.
 - a) MPI RSP Master Painters Institute Repaint Surface Preparation Standards, Chapter 6, Section 2.
 - 3) MPI – Glossary.
- c. PDCA Painting and Decorating Contractors of America, latest edition of the Architectural Specification Manual, as prepared by Specification Services, Inc., Washington State Council of the PDCA.

1.3 DEFINITIONS

- A. The following definitions are just some of the more important definitions used within this section, and were taken from the MPI Glossary Manual, or used to simplify language used by the Architect. These definitions and others stated within the Manual apply for this Specification Section.
 - 1. Acrylic Latex An aqueous dispersion of acrylic resins.
 - 2. Acrylic Resin A/R - Synthetic resins made by polymerizing esters of acrylic acid.
 - 3. A/U Aliphatic Urethane
 - 4. A/A/U Aliphatic Acrylic Urethane
 - 5. Blocking Sticking or bonding together of two painted surfaces that are in direct contact. Most often caused by stacking painted articles before dry or reaching a "block free" (or "non-blocking") stage.
 - 6. DFT Dry Film Thickness – the depth or thickness of a coating in the dry state. Expressed in mils (1/1000 inch) or microns.
 - 7. DRY FALL A Fog Paint designed to be applied by spray and dries fast enough that the overspray will be a dry powder after falling a certain distance. The dust can then be swept or vacuumed up.
 - 8. ODFT "Overall Dry Film Thickness" – the depth or thickness of a complete coating system in the dry state. Expressed in mils (1/1000 inch) or microns.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 - 1. Product Data.
 - a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
 - b. Material Safety Data Sheets will be turned over to the Owner in compliance with local rules and regulations, but will not be reviewed.
 - c. Materials Lists:
 - 1) Format in accordance with Article in this section titled "Paint Finish Schedule".
 - d. Additional submittals to substantiate proposed equivalent systems.
 - 2. Samples.
 - a. Brushouts: In accordance with Specification Section - SUBMITTAL PROCEDURES.
 - b. For each color and finish selected provide paint brushouts showing color tint graduation of each coat to and including the final color coat.
 - 1) Selected colors and finishes:
 - a) Size: 8 1/2" x 11" boards.
 - b) Quantity: 3 boards of each color and finish.

- c) Board material wherever possible and for transparent finishes shall be same as material to be finished. Opaque finishes may be on heavy card stock.
- 3. Closeout Submittals in accordance with the following:
 - a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - b. Project Documents in accordance with Specification Section - PROJECT DOCUMENTS.
 - c. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:

- 1. Material Qualifications:
 - a. Where possible (except for specified materials), paint materials shall be products of only one manufacturer.
 - b. All materials, preparation and workmanship shall conform to requirements of the specified edition of the Architectural Painting Specification Manual by the Master Painters Institute (hereafter referred to as the MPI Painting Manual), unless otherwise indicated.
 - c. Flame Spread Ratings in accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials":
 - 1) Paint finishes in required exit stairways, corridors and exitways must meet flame spread ratings as required by regulatory agencies.
 - 2) Class A - Tunnel Test 0-25 for enclosed required exit stairways and other exit ways.
 - 3) No interior paint or wall finish will be permitted having a tunnel test in excess of 200. All paint materials must be certified that materials meet these requirements.
 - d. Manufacturer's Written Instructions - One for the Architect, Contractor and the Owner:
 - 1) Submit three (3) copies of manufacturer's written instructions.
 - e. Compatibility:
 - 1) Paint materials and equipment shall be compatible in use.
 - 2) Finish coats shall be compatible with prime coat.
 - 3) Prime coats shall be compatible with surface to be coated.
 - 4) Tools and materials shall be compatible with coating to be applied.
 - f. Air Quality:
 - 1) Paint materials and equipment used for application will comply with CARB Air Quality Control Standards in effect at the Project Site and at the time of application.
- 2. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - 1) Only qualified journeypersons, as defined by local jurisdiction, shall be engaged in painting and decorating work. Apprentices may be employed provided they work under the direct supervision of a qualified journeyperson in accordance with trade regulations.
- 3. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

- B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CAL/OSHA California/Occupational Safety and Health Act
 - b. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - c. CBC California Building Code (CBC 803.1.1)
- C. Mockups: Provide a full-coat benchmark finish sample for each type of coating and substrate required for Architect's review. Duplicate finish of approved sample Submittals.
1. Wall Finishes shall be at least 100 sq. ft., suitably marked "MOCKUPS" and protected for the duration of the construction Project.
 2. Small areas and items can be selected by the Contractor, suitably marked "MOCKUPS" and protected for the duration of the construction Project.
 3. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface.
 4. Approved mockups (wall areas and small areas or items) may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with all other related work.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties and guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
 2. Damaged products will not be accepted.
- B. Storage and protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units, in a locked, clean and neat, well ventilated area.
 - a. All receiving, opening and mixing shall be done in this area.
 - b. Oily rags and waste shall be removed from area each night and all other precautions shall be taken to avoid danger of fire.

- c. Empty containers shall not be removed from site, unless otherwise approved by the Architect.
- d. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 PROJECT CONDITIONS

A. Environmental requirements:

1. Rain or Fog:
 - a. No work under this section shall be started or maintained under threat of rain.
 - b. Surfaces shall be painted only when they are free from moisture.
 - c. No painting of exterior surfaces shall be done less than 72 hours of actual drying weather after a rain or during periods of dew or fog.
 - d. Perform no painting or decorating work when the maximum moisture content of the substrate exceeds:
 - 1) 12 percent for concrete and masonry (clay and concrete brick / block).
 - 2) 15 percent for wood.
 - 3) 12 percent for plaster and gypsum board.
 - e. Perform no painting or decorating work when the relative humidity is above 85 percent or when the dew point is less than 5 degrees F variance between the air / substrate temperature.
2. Temperature: No painting shall be done when ambient air and substrate temperatures are below 50 degrees F.
3. Alkalinity: An alkali level of between 7.0 and 8.5 pH is suitable for painting. Any reading above that level, then the surface shall be neutralized as required for the surface to be painted.
 - a. Methods shall be consistent with MPI - Architectural Painting Specification Manual, and shall not result in any adverse condition causing inadequate adhesion, improper curing and drying, or durability of paint system.
4. No exterior painting shall be done during winds or dusty conditions.
5. Perform no exterior painting and decorating work unless environmental conditions are within MPI and paint manufacturer's requirements or until adequate weather protection is provided.
 - a. Where required to meet project schedules, suitable weatherproof covering and sufficient heating facilities shall be in place to maintain minimum ambient air and substrate temperatures for 24 hours before, during and after paint application.
6. Perform no interior painting or decorating work unless adequate continuous ventilation and sufficient heating facilities are in place to maintain minimum ambient air and substrate temperatures above minimum requirements for 24 hours before, during and after paint application.
 - a. Where required to meet project schedules, provide supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.

B. Existing Conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Concrete and masonry surfaces shall be installed at least 28 days prior to painting and decorating work and shall be visually dry on both sides.

3. Conduct all moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple cover patch test.
4. Test concrete, masonry and plaster surfaces for alkalinity as required.
5. Contractor shall provide a minimum lighting level of 323 Lux (30 foot candles) on surfaces to be painted or decorated.

1.8 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.
 - a. Original adherence of all materials and no evidence of any surface defect shall be maintained during warranty period.
 - b. Color at end of warranty period shall remain free from serious fading and any discernible variations shall be uniform.

B. Manufacturer's Warranty:

1. In accordance with manufacturer's written standard warranty:
2. Provide Paint Manufacturer's special ten (10) year Material Warranty co-endorsed by the installer for exterior paint application of cement plaster surfaces.
 - a. Warranty period: Ten (10) Years.
3. Provide Water-Repellent Manufacturer's special Weatherproofing Warranty co-endorsed by the installer for exterior sealer application of concrete or concrete block surfaces.
 - a. Warranty period: Ten (10) Years.

C. Installer's Warranty:

1. Paint Installer's Warranty:
 - a. Installer will certify that a Paint Manufacturer's Representative tested the substrate according to Paint Manufacturer's standard procedures and have submitted project information and test patch forms.
 - b. Installer shall certify that Paint Manufacturer's products were installed on the structure in accordance with manufacturer's specification requirements.
 - c. Installer further agrees that if installer fails to fulfill their obligation under this certification statement within 30 days notice of the complaint, Paint Manufacturer may proceed with the investigation and repairs and shall pay the entire material cost, providing it wasn't the installer's responsibility.
2. Water-Repellent Installer's Warranty:
 - a. Warranty period: Two (2) Years.
 - b. Installer will certify that a Water-Repellent Manufacturer's Representative tested the substrate according to Water-Repellent Manufacturer's standard procedures and have submitted project information and test patch forms.
 - c. Installer shall certify that Water-Repellent Manufacturer's products were installed on the structure in accordance with manufacturer's specification requirements.
 - d. Installer agrees:
 - 1) Investigate all complaints of leakage and/or water absorption on surfaces to which Water-Repellent Manufacturer's weatherproofing products were applied and provide a written report of the cause to Water-Repellent Manufacturer within thirty (30) days of the complaint.
 - 2) Re-apply Water-Repellent Manufacturer's weatherproofing products according to Water-Repellent Manufacturer's standard procedures at installer's cost for labor and material if the leakage and/or water absorption is due to improper surface preparation, application and/or improper use of material.

- 3) Request authority from Water-Repellent Manufacturer to re-apply Water-Repellent Manufacturer's weatherproofing products at Water-Repellent Manufacturer's expense to areas, which were not rendered hydrophobic due to imperfect weatherproofing materials.
- e. Installer further agrees that if installer fails to fulfill their obligation under this certification statement within 30 days notice of the complaint, Water-Repellent Manufacturer may proceed with the investigation and repairs and shall pay the entire cost, providing it wasn't the installer's responsibility.

1.9 MAINTENANCE

- A. Extra Materials:
 1. Quantity: 10 percent of quantity needed to paint Project, but not to exceed one gallon, of each type and color of finish coat used.
 2. Identification: At project completion, provide an itemized list complete with manufacturer, paint type and color coding for all colors used, and locations within the Project for Owner's later use in maintenance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 1. Specified paint coating product manufacturer, or approved equivalent:
 - a. PPG PAINTS.
 - 1) Composed of the following companies: AMERITONE PAINT, DECRATREND, DEFT, DEVOE COATINGS, DEVOE PAINT, FLOOD WOOD CARE, FULLER O'BRIEN, GLIDDEN, and SINCLAIR PAINT.
 - b. Also specified: GEMINI and MONOPOLE.
 - c. Acceptable alternative manufacturers:
 - 1) DUNN EDWARDS, KELLY MOORE PAINTS, SHERWIN WILLIAMS, BENJAMIN MOORE and VISTA PAINT. Submittals by these manufacturers, subject to specification requirements, must be in accordance with Section - SUBMITTAL PROCEDURES.
 - a) Paint material quality and systems shall be equal to numbers and systems listed in Paint Finish Schedule at the end of this section.
 - b) If submitted paint numbers differ from Darden Architects, Inc. Paint Equivalency List, additionally submit explanation of difference and certification letter from the installer attesting that the different product is equal to or better than specified; i.e. equivalent or better percentage of solids, system ODFT, and VOC compliant. Paint Equivalency List published by Darden Architects, Inc. is available only for this project at written request.
 2. Specified water-borne Alkyltrialkoxo Silane water repellent product manufacturer, or approved equivalent:
 - a. EVONIK DEGUSSA CORPORATION.

3. Specified Graffiti coating manufacturer, or approved equivalent:
 - a. Sacrificial:
 - 1) VISUAL POLLUTION TECH, INC.
 - b. Non-sacrificial:
 - 1) BASF HYDROZO.
 - 2) EVONIK DEGUSSA CORPORATION.
 - 3) THIS STUFF WORKS - TSW
 4. Specified Intumescent Paint Manufacturer, or approved equivalent:
 - a. ISOLATEK INTERNATIONAL
 5. Specified High Gloss Epoxy Pool Paint and Primer Manufacturer, or approved equivalent:
 - a. RAMUC.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
1. Shop Primers or Coil-Coated Primers: It shall be assumed that all Shop Primed or Coil-Coated primed metals do not meet the requirements for primer material and mil thickness as defined herein. As such, all Shop Primed or Coil-Coated primed metals shall be field primed as indicated in the schedule.
- B. Material Quality: Provide manufacturer's best-quality coating material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
1. All materials used shall be lead and mercury free and shall have low VOC content to meet the applicable CARB standards in the area where the Project is located.
 2. All paint materials shall have good flowing and brushing properties and shall dry or cure free of blemishes, sags, air entrapment, etc.
 3. All Water-Repellant Coatings shall comply with the following:
 - a. Provide Alkyltrialkoxo Silane combination with a ratio concentration and application procedure as recommended by the manufacturer with the ability to cover in one or more applications for a ten year warranty in accordance with the following substrates:
 - 1) Concrete.
 - 2) Concrete Masonry Units.
 - a) Ground Faced Concrete Masonry Units.
 - b) Split-Faced Concrete Masonry Units.
 - b. Color: Clear.
 - c. Active Substance: Alkyltrialkoxo Silane.
 - d. Active Content: 100 percent.
 - e. Solvent: Water.
 - f. Flash Point (Concentrate): 93 degrees F.
 - g. Flash Point (Mixed): 200 degrees F.
 - h. Density: 7.77 lbs./gallon.
 - i. VOC (19:1): 50 g/liter (Maximum).
 - j. VOC (9:1): 100 g/liter (Maximum).
 - k. VOC (6:1): 200 g/liter (Maximum).

- 4. All Bituminous Paint:
 - a. Shall comply with Cold-Applied Asphalt-Mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil thickness per coat.

2.3 MIXES

- A. Mixing and Tinting:
 - 1. Unless otherwise specified herein or pre-approved, all paint shall be ready-mixed and pre-tinted at the factory. Re-mix all paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and color and gloss uniformity.
 - 2. Paste, powder or catalyzed paint mixes shall be mixed in strict accordance with manufacturer's written instructions.
 - 3. Where thinner is used, addition shall not exceed paint manufacturer's written recommendations.
 - 4. Do not use kerosene or any such organic solvents to thin water-based paints.
 - 5. Thin paint for spraying in strict accordance with paint manufacturer's written instructions. If directions are not on the container, obtain instructions in writing from the manufacturer and provide one copy of instructions to the Project Inspector.

2.4 FINISHES

- A. Finish Colors:
 - 1. Unless otherwise specified herein, all painting work shall be in accordance with MPI Premium Grade finish requirements as a minimum.
 - 2. Determined by Architect prior to or as work progresses.
 - a. Colors to be selected from paint manufacturer's full color systems, including standard, premium and custom colors.
 - 3. When deep or 'Ultra colors' are selected, submit to Architect proposed revision to specified system product numbers, according to manufacturer's written recommendations.
 - a. When deep or ultra colors are selected for use on walls or special color treatments such as graphics or many color changes are desired, the areas and extent of use will be clarified upon request of the Contractor.
 - 4. Gloss standards, in accordance with MPI standards, using the ASTM D 523 "Test for Specular Gloss", are as follows:

Gloss Level	Description	Units at 60 degrees	Units at 85 degrees
G1	Matte or Flat Finish	0 to 5	10 max.
G2	Velvet Finish	0 to 10	10 to 35
G3	Eggshell Finish	10 to 25	10 to 35
G4	Low Sheen or Satin Finish	20 to 35	35 min.
G5	Semi-Gloss Finish	35 to 70	
G6	Gloss Finish	70 to 85	
G7	High-Gloss Finish	Greater than 85	

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affects the execution of work under this specification section.
 - a. Thoroughly examine (and test as required, if necessary) all conditions and surfaces to be painted and report in writing to the Contractor and the Architect any conditions or surfaces that will adversely affect the work of this section.
 - b. The Installer is responsible for verifying the compatibility of items primed by others and the finish coat or coats required by the Contract Documents. Should an incompatibility occur, the Installer (along with the manufacturer's technical representative) will recommend compatible alternatives for the Architect's approval.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Protection before Application:

1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
2. Removal of Hardware and Miscellaneous Items:
 - a. Coordinate the work with other trades so that they remove electrical outlet and switch plates, mechanical diffusers, escutcheons, registers, surface hardware, fittings, fastenings, and the like prior to starting work under this Section.
 - b. Store during painting work. Coordinate cleaning and reinstallation after painting work is finished.
 - c. Do not use solvent or cleaning agents detrimental to permanent finishes.
 - d. Remove doors before painting to paint bottom and top edges, and then re-hang.
3. Protect adjacent surfaces against damage from painting operations. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
 - a. Protective means include: Drop cloths, shields, masking templates, etc.
 - b. Exterior surfaces include: landscaping, walks, drives, adjacent building surfaces, glazing, aluminum surfaces, etc.
 - c. Interior surfaces include: rating and instruction labels on doors, frames, equipment, piping, etc.

B. Surface preparation:

1. General:
 - a. In accordance with MPI Standards.
 - b. Surfaces to be finished shall be clean, dry and free of dirt, passivators, oils, loose paint and any other contamination that would adversely affect adhesion, protective properties or appearance of the coating.
 - c. All oil, grease, dirt or other foreign matter shall be removed by washing with a solution of cleaner and water, rinse and allow to dry.

- d. If efflorescence, alkali or glazed surfaces exist, neutralize with acid wash followed by thorough water rinsing.
 - 1) Protect all adjacent substrates or materials that could be affected by acid washing or water rinsing. Collect all washing & rinsing residue and dispose of away from structures.
2. Wood Substrates - (New and Repaint Surfaces):
 - a. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
 - b. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
 - c. Fill holes and other imperfections with putty or plastic wood to match natural finish before and after application of prime or seal coat.
 - d. Provide necessary extra treatment over knots, pitch pockets, sappy portions and other defects to produce a proper base for painting.
 - e. Sand down raised grain or rough surfaces.
 - f. Clean surfaces free of dust, soil and other foreign material.
3. Gypsum Board Substrates - (New and Repaint Surfaces):
 - a. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
 - b. Clean surfaces of dirt, laitance, excess mortar and foreign matter.
 - c. Do all necessary minor sanding.
 - d. Fill minor cracks, scratches, holes and nail heads.
4. Plaster Substrates - (New and Repaint Surfaces):
 - a. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
 - b. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
 - c. Clean surfaces of dirt, laitance, excess mortar and foreign matter.
 - d. Neatly patch, flush and smooth, minor cracks, holes, pits and other imperfections in plaster or concrete surfaces.
5. Concrete Substrates - (New and Repaint Surfaces):
 - a. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
 - b. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
 - c. Clean surfaces of dirt, laitance, excess mortar and foreign matter.
 - d. Neatly patch, flush and smooth, minor cracks, holes, pits and other imperfections in plaster or concrete surfaces.
6. Metal Substrates - (New and Repaint Surfaces):
 - a. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
 - b. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
 - c. Shop Primed or Factory Primed Surfaces:
 - 1) Shop Primed or Factory Primed Surfaces are considered "un-primed" due to their mil thicknesses provided, and common incompatibility issues with specified coating system; and are suitable only for protection during transit (shipment and storage) until incorporated into the Project.
 - 2) Remove dust, oil and rust.
 - 3) Sand surface lightly.
 - 4) Touch up imperfections, scratches, surface damage, etc. with the appropriate primer.
 - 5) Field connection welds, soldered joints, burned and abraded portions shall be spot primed with the appropriate primer.
 - d. Coil-Coated Product Surfaces:
 - 1) Coil-Coated Product Surfaces are considered "un-primed" due to their mil thicknesses provided, and the common incompatibility issues with specified coating system; and are suitable only for protection during shipment and storage until incorporated into the Project.
 - 2) Remove dust, oil and rust.
 - 3) Touch up imperfections, scratches, surface damage, etc. with the appropriate primer.

- 4) Field connection welds, burned and abraded portions shall be spot primed with the appropriate primer.
- 5) Field apply manufacturer's written recommended primer coat over entire surface compatible with substrate finish and finish coats indicated on the paint schedule.
- e. Un-primed Surfaces:
 - 1) Remove dust, rust, mill scale, grease and foreign matter by sand blasting or wire brushing.
 - 2) Surfaces to be smooth and ready to receive coatings.
- f. Non-Ferrous Metal, Galvanized, Aluminum, and Copper Surfaces:
 - 1) Metal Etch and Solvent Clean per SSPC-SP 1 or clean with TSP or other appropriate cleaner followed by thorough water rinsing.
 - 2) Brush Blast to standards of SSPC-SP 16, or if blasting is not feasible, sand thoroughly, wipe clean and apply a test patch for the coating specified.
 - 3) Allow system to cure at least one week, then test adhesion per ASTM D 3359 "Standard Test Methods for Measuring Adhesion by Tape Test."
7. Concrete Block Surfaces - (New and Repaint Surfaces):
 - a. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
 - b. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
 - c. Clean and free of all dirt, dust, rust, oil and free from all foreign matter.
 - d. Test for moisture content.
 - 1) Do not coat if moisture is present.
 - 2) Concrete Blocks to be thoroughly dry and cured prior to coating.
 - e. Do not coat Masonry wall if joints are not properly pointed, has excessive mortar drippings cracked units or shows signs of excessive efflorescence.
 - 1) Notify Architect promptly through General Contractor.
 - 2) Do not coat until unsatisfactory and unacceptable Concrete Block surfaces are corrected suitable for coating.
 - f. Do not apply opaque finishes to Concrete Block with airless sprayer unless "backrolled."

3.3 APPLICATION

A. Standards:

1. In accordance with MPI Painting Manual.
2. In accordance with manufacturer's specifications.

B. Method:

1. Apply by brush, roller or spray in accordance with MPI Painting Manual and the coating manufacturer's written recommendations except where specified otherwise in Schedule of Paint Finishes.
2. Painting of doors by rollers shall only be allowed only if the applicator uses a 1/4 inch nap or less roller.

C. Coatings:

1. All coatings shall be applied without reduction except as specifically required by label directions, or required to be reduced by this Specification. In such cases, reduction shall be the minimum permitted and shall not exceed VOC limits.
2. Apply each coat evenly and allow each coat to dry prior to applying succeeding coats. Each coat to have enough consistency to conceal work to which it is applied.
 - a. Follow manufacturer's recommendations for recoat windows when using high performance coatings, epoxys, and urethanes.

3. Cut into a true line and leave smooth and clean without overlapping. Coat doors and windows in open position.
4. Sand finishes on smooth surfaces to assure proper adhesion of subsequent coats.
5. Tint each undercoat a lighter shade to facilitate identification of each coat, if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
6. Apply coating systems so as to obtain not less than the dry film mil thickness recommended by the manufacturer.
7. Sand metal work only as necessary to provide for the complete bonding of coats.
8. Project Inspector to inspect and approve each coat and operation before succeeding coats are applied.
9. Finish work to be free from runs, sags, defective application and improper workmanship.
10. Back prime all woodwork and casework coming in contact with plaster, masonry or concrete immediately upon delivery to project.
11. Post sign promptly following application of coatings.

3.4 FIELD QUALITY CONTROL

- A. All surfaces, preparation and paint applications shall be inspected by the Project Inspector:
1. Painted exterior and interior surfaces shall be considered to lack uniformity and soundness if any of the following defects are apparent to the Painting Inspection by the Project Inspector:
 - a. Brush / Roller marks, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas, and foreign materials in paint coatings.
 - b. Evidence of poor coverage at rivet heads, plate edges, lap joints, crevices, pockets, corners and re-entrant angles.
 - c. Damage due to touching before paint is sufficiently dry or any other contributory cause.
 - d. Damage due to application on moist surfaces or caused by inadequate protection from the weather.
 - e. Damage and / or contamination of paint due to blown contaminants (dust, spray paint, etc.).
 2. Painted surfaces shall be considered unacceptable if any of the following are evident under natural lighting source for exterior surfaces and final lighting source (including daylight) for interior surfaces:
 - a. Visible defects are evident on vertical surfaces when viewed at normal viewing angles from a distance of not less than 39 inches.
 - b. Visible defects are evident on horizontal surfaces when viewed at normal viewing angles from a distance of not less than 39 inches.
 - c. Visible defects are evident on ceiling, soffit and other overhead surfaces when viewed at normal viewing angles.
 - d. When the final coat on any surface exhibits a lack of uniformity of color, sheen, texture, and hiding across full surface area.
 3. Painted surfaces rejected by the Project Inspector shall be made good at the expense of the Contractor. Small affected areas may be touched up; large affected areas or areas without sufficient dry film thickness of paint shall be repainted. Runs, sags of damaged paint shall be removed by scraper or by sanding prior to application of paint.

3.5 CLEANING

- A. Clean in accordance with Specification Section - TEMPORARY FACILITIES AND CONTROLS and PROJECT CLOSEOUT.

1. Remove all paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.
2. Keep work area free from unnecessary accumulation of tools, equipment, surplus materials and debris.
3. Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.
4. Clean equipment and dispose of wash water / solvents as well as all other cleaning and protective materials (e.g., rags, drop cloths, masking papers, etc.), paints, thinners, paint removers / strippers in accordance with the safety requirements of authorities having jurisdiction in the place where the Project is located.
5. Protect and safeguard work of other trades.

3.6 PROTECTION

- A. Protection from Weather:
 1. Protect newly installed work from moisture for a period of time as recommended by the manufacturer after application.
- B. Protection from Traffic:
 1. Erect barriers or screens and post signs to warn of or limit or direct traffic away or around work area as required.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.7 SCHEDULES

- A. Refer to Exterior and Interior Finish Schedules on Drawings for applicable finishes used. This is a guide only and paint sub-contractor is responsible to check all drawings and be responsible for all paint work required to cover the complete painting and finishing of the interior and exterior including specialty items.
- B. It is the intent of the specifications and drawings to cover the complete painting and finishing of the Project whether or not it is specifically called for in the Specifications, Schedule of Paint Finishes, or indicated on the Drawings. Surfaces not specified in Paint Finishes Schedule shall be in accordance with manufacturer's written recommendations.
 - a. The following schedule was compliant with CARB Air Quality Standards at press time.
 - 1) Inform the Architect of any changes caused by stricter Air Quality Standards as part of the submittal process.
 - 2) Provide products compliant with CARB Air Quality Standards and Local Air Quality Control District requirements at the time of installation.
- C. Exception: When the Project involves remodel work, the scope of work is limited to the remodel area and adjacent existing substrates to minimize visible color incompatibility.
- D. Provide coating system minimum ODFT specified.
 1. Provide ODFT per system specified.
 - a. Do not apply thicker coats than specified to achieve ODFT. Apply additional coats if necessary for uniform color.
 2. "Ultra Color" Note: A fourth and/or fifth coat may be required to achieve uniform chromatic hue without ghosting from undercoat or substrate.

- a. The Contractor shall consider all Metal Paint Finishes noted "Ultra-color" as requiring as many as five (5) total coats.

E. INTERIOR PAINT FINISHES:

1. INTERIOR GYPSUM BOARD

- a. DW-2 Eggshell Acrylic Non-Blocking Enamel Minimum ODFT 4.0 MILS.
 - 1) 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
 - 2) 2nd Coat Eggshell 0 VOC (SPH-0) 6-4310XI
 - 3) 3rd Coat Eggshell 0 VOC (SPH-0) 6-4310XI
- b. DW-3 Gloss Acrylic Non-Blocking Enamel Minimum ODFT 9.4 MILS.
 - 1) 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
 - 2) 2nd Coat Gloss Acrylic PITT-TECH PLUS 90-1310
 - 3) 3rd Coat Gloss Acrylic PITT-TECH PLUS 90-1310
- c. DW-4 Gloss Epoxy Polyamide (Corrosion Resistant) Minimum ODFT 7.6 MILS.
 - 1) 1st Coat Acrylic Primer SEAL GRIP 17-921
 - 2) 2nd Coat Epoxy Gloss AQUAPON WB-EP 98E-1
 - 3) 3rd Coat Epoxy Gloss AQUAPON WB-EP 98E-1
- d. DW-5 Semi-Gloss Acrylic Non-Blocking Enamel Minimum ODFT 4.0 MILS.
 - 1) 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
 - 2) 2nd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI
 - 3) 3rd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI
 - 4) Note: This system was previous named "DW-2".

2. INTERIOR CEMENT PLASTER, VENEER PLASTER OR GYPSUM PLASTER

- a. P-1 Flat Latex Minimum ODFT 4.8 MILS.
 - 1) 1st Coat Acrylic Primer-Sealer 3210
 - 2) 2nd Coat Flat 0 VOC (SPH-0) 6-4110XI
 - 3) 3rd Coat Flat 0 VOC (SPH-0) 6-4110XI
- b. P-4 Gloss Epoxy Polyamide (Corrosion Resistant) Minimum ODFT 7.6 MILS.
 - 1) 1st Coat Acrylic Primer SEAL GRIP 17-921
 - 2) 2nd Coat Epoxy Gloss AQUAPON WB EP 98E-1 Series
 - 3) 3rd Coat Epoxy Gloss AQUAPON WB EP 98E-1 Series

3. INTERIOR CONCRETE OR CONCRETE MASONRY UNITS

- a. CB-1 Clear Water Repellent Sealer
 - 1) One Coat Alkyltrialkoxo Silane
 - a) EVONIK DEGUSSA "Aqua-Trete®CONCENTRATE."
 - 2) Follow manufacturer's recommended coverage rate and installation recommendations for type of substrate to be covered.
 - 3) Provide manufacturer's 10 year warranty for Concrete Masonry Units and Split Faced Concrete Masonry Units.
- b. CB-5 Clear High-Gloss Polyamide Epoxy Minimum ODFT 5.0 MILS.
 - 1) 1st Coat Epoxy Gloss MONOPOLE Permashield 200
 - 2) 2nd Coat Epoxy Gloss MONOPOLE Permashield 200

4. INTERIOR METALS

- a. **PRIMER NOTE:** Metals that are shop primed shall be considered "un-primed" and shall be primed with appropriate primer and thicknesses listed below:
 - 1) Ferrous Metal:
 - a) PPG DEVFLEX 4020 "Red" Mult-Purp. Metal Primer DFT 3.0 mils.
 - 2) Non-Ferrous Metal, Galvanized Metal or Aluminum:
 - a) PPG DEVFLEX 4020 "White" Mult-Purp. Metal Primer DFT 3.0 mils.

- b. COIL-COATED PRODUCTS NOTE: Metal products primed with coil-coated products are to be assumed to be "un-primed" products and shall be additionally coated (or primed again) as follows:
 - 1) Coil-Coated Products:
 - a) Field apply manufacturer's recommended primer coat and mil thickness over entire surface compatible with substrate finish and finish coats indicated on paint schedule.
- c. M-1 Flat Latex Minimum ODFT 5.8 MILS.
 - 1) 1st Coat Primer See primer note above.
 - 2) 2nd Coat Flat 0 VOC (SPH-0) 6-4110XI
 - 3) 3rd Coat Flat 0 VOC (SPH-0) 6-4110XI
- d. M-4 Semi-Gloss Epoxy Polyamide Minimum ODFT 6.0 MILS.
 - 1) 1st Coat Primer See primer note above.
 - 2) 2nd Coat Epoxy Semi-Gloss PITT-GLAZE 16-510
 - 3) 3rd Coat Epoxy Semi-Gloss PITT-GLAZE 16-510
- e. M-5 Gloss Epoxy Polyamide Minimum ODFT 4.6 MILS.
 - 1) 1st Coat Epoxy Primer SEAL-GRIP 17-921
 - 2) 2nd Coat Epoxy Gloss AQUAPON WB EP 98E-1 Series
 - 3) 3rd Coat Epoxy Gloss AQUAPON WB EP 98E-1 Series
- f. M-5 Water Base S/G Epoxy (Corrosion Resistant) Minimum ODFT 7.6 MILS.
 - 1) 1st Coat Acrylic Primer SEAL GRIP 17-921
 - 2) 2nd Coat WB Epoxy S/G PITT-GLAZE 16-510
 - 3) 3rd Coat WB Epoxy S/G PITT-GLAZE 16-510
- g. M-6 Flat Waterborne Paint Minimum ODFT 4.4 MILS.
 - 1) 1st Coat Flat Dry Fall Prime SUPER TECH 6-726XI
 - 2) 2nd Coat Flat Dry Fall Finish SUPER TECH 6-726XI
- h. M-7 Semi-Gloss Waterborne Paint Minimum ODFT 4.4 MILS.
 - 1) 1st Coat S/G Dry Fall Primer SUPER TECH 6-724XI
 - 2) 2nd Coat S/G Dry Fall Finish SUPER TECH 6-724XI

F. EXTERIOR PAINT FINISHES

1. EXTERIOR SOFFIT BOARD

- a. ESB-1 Lo-Sheen 100 % Acrylic Resin (A/R)-Heavy Stipple Minimum ODFT 5.8 MILS.
 - 1) 1st Coat Epoxy Primer SEAL-GRIP 17-921
 - 2) 2nd Coat 100 percent Acrylic SUNPROOF SATIN 76-Series
 - 3) 3rd Coat 100 percent Acrylic SUNPROOF SATIN 76-Series
 - 4) *Note: 2nd Coat to have medium size aggregate added to achieve heavy stipple texture.

2. EXTERIOR CEMENT PLASTER

- a. EP-2 Semi-Gloss 100 percent Acrylic Minimum ODFT 6.6 MILS.
 - 1) 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
 - 2) 2nd Coat 100 percent Acrylic Semi-Gloss SUNPROOF SEMI-GLOSS 78-Series
 - 3) 3rd Coat 100 percent Acrylic Semi-Gloss SUNPROOF SEMI-GLOSS 78-Series
- b. EP-3 Gloss Styrene Acrylic Minimum ODFT 5.6 MILS.
 - 1) 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
 - 2) 2nd Coat Gloss ADVANTAGE 900 INT/EXT STYRENE ACRYLIC GLOSS
 - 3) 3rd Coat Gloss ADVANTAGE 900 INT/EXT STYRENE ACRYLIC GLOSS

3. EXTERIOR CONCRETE OR CONCRETE MASONRY UNITS:

- a. ECB-1 Clear Water Repellent Sealer:

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- 1) One Coat Alkyltrialkoxo Silane:
 - a) EVONIK DEGUSSA "Aqua-Trete@CONCENTRATE."
 - 2) Provide manufacturer's 10 year warranty for Concrete Masonry Units and Split Faced Concrete Masonry Units.
 - b. ECB-2 Flat 100 percent Acrylic Minimum ODFT 11.5 MILS.
 - 1) 1st Coat W/B Acrylic Block Filler SPEEDHIDE 6-7
 - a) Omit at concrete surfaces
 - 2) 2nd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
 - 3) 3rd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
 - c. ECB-3 Flat 100 percent Acrylic Minimum ODFT 5.5 MILS.
 - 1) 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
 - 2) 2nd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
 - 3) 3rd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
4. EXTERIOR METAL
- a. PRIMER NOTE: Metals shop primed shall be considered "un-primed" and shall be primed with appropriate primer and thicknesses listed below:
 - 1) Ferrous Metal, Type 1 Typical:
 - a) PITT TECH PLUS 4020 "Red" Multi-Purpose Metal Primer DFT 3.0 mils.
 - 2) Ferrous Metal, Type 2 as specified in Specification Section – STEEL AND FABRICATIONS:
 - a) AMERCOAT 68HS Reinforced Inorganic Zinc-Rich Urethane Metal Primer DFT 5.0 mils.
 - 3) Ferrous Metal, Type 3 when Urethane is used as a finish:
 - a) AMERLOCK 2VOC/400 VOC Epoxy Metal Primer DFT 6.0 mils.
 - 4) Non-Ferrous Metal, Type 4 Galvanized Metal or Aluminum:
 - a) PITT TECH PLUS "White" Multi-Purpose Metal Primer DFT 3.0 mils.
 - 5) Non-Ferrous Metal, Type 5 Galvanized Metal or Aluminum, when Urethane is used as a finish.
 - a) AMERLOCK 2VOC/400 VOC Epoxy Metal Primer DFT 6.0 mils.
 - b. COIL-COATED PRODUCTS NOTE: Metal products primed with coil-coated products are to be assumed to be unprimed products and shall be re-primed as follows:
 - 1) Coil-Coated Products:
 - a) Field apply manufacturer's recommended primer coat and mil thickness over entire surface compatible with substrate finish and finish coats indicated on paint schedule.
 - c. EM-1 Flat 100 percent Acrylic Minimum ODFT 7.4 MILS.
 - 1) 1st Coat Primer See primer notes above.
 - 2) 2nd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
 - 3) 3rd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
 - d. EM-2 Semi-Gloss "Ultra Color" 100 percent Acrylic Minimum ODFT 7.2 MILS.
 - 1) 1st Coat Primer See primer notes above.
 - 2) 2nd Coat 100 percent Acrylic Semi-Gloss SUNPROOF SEMI-GLOSS 78-Series
 - 3) 3rd Coat 100 percent Acrylic Semi-Gloss SUNPROOF SEMI-GLOSS 78-Series
 - e. EM-3 Gloss "Ultra Color" 100 percent Acrylic Waterborne Minimum ODFT 11.0 MILS.
 - 1) 1st Coat Primer See primer notes above.
 - 2) 2nd Coat Gloss Acrylic PITT-TECH PLUS 90-1310
 - 3) 3rd Coat Gloss Acrylic PITT-TECH PLUS 90-1310

- f. EM-4 Gloss "Ultra Color" Aliphatic Acrylic Urethane (A/A/U) Finish, Spray Applied, Deep Tone, Custom Color Minimum ODFT 16.0 MILS.
- 1) 1st Coat Primer See primer notes above.
 - 2) 2nd Coat A/A/U Gloss Color AMERSHIELD VOC
 - 3) 3rd Coat A/A/U Gloss Color AMERSHIELD VOC
- g. EM-5 Gloss "Ultra Color" Aliphatic High Solids Finish, Spray Applied, Deep Tone, Custom Color with clear protective coats Minimum ODFT 18.0 MILS.
- 1) 1st Coat Primer See primer notes above
 - 2) 2nd Coat A/A/U Gloss Color AMERSHIELD VOC
 - 3) 3rd Coat A/A/U Gloss Color AMERSHIELD VOC
 - 4) 4th Coat A/A/U Gloss Clear AMERSHIELD VOC
 - 5) 5th Coat A/A/U Gloss Clear AMERSHIELD VOC
- h. EM-6 Semi-Gloss "Ultra Color" Aliphatic Urethane (A/U) Finish, Spray Applied, Deep Tone, Custom Color Finish Minimum ODFT 20.0 MILS.
- 1) 1st Coat Primer See primer notes above.
 - 2) 2nd Coat A/A/U Semi-Gloss AMERCOAT 240
 - 3) 3rd Coat A/A/U Semi-Gloss AMERSHIELD VOC

G. SPECIALTY PAINT FINISHES:

1. PROVIDE SPECIALTY PAINT FINISHES AS SHOWN OR AS FOLLOWS:

- a. **Finish No. X-1:** Minimum ODFT 15.0 MILS.
- 1) Lines on Concrete or Asphaltic Concrete Paving Exit and Entrance Signs - 10" width lines, maximum. Reflectorize as required.
 - 2) PPG ZoneLine
- b. **Finish No. X-2:** Minimum ODFT 15.0 MILS.
- 1) Lines on Walk Top. Colors as selected by Architect.
 - 2) PPG ZoneLine
- c. **Finish No. X-3:** Minimum ODFT 2.2 MILS.
- 1) Space above Vents or Grilles.
 - 2) 1st Coat 100 percent Acrylic Flat Black 72-Series
- d. **Finish No. X-4:** Minimum ODFT 7.0 MILS.
- 1) Piping Black Steel or Cast Iron.
 - 2) 1st Coat Multi-Purpose Metal Primer:
 - a) PITT TECH PLUS 4020 "Red"
 - 3) 2nd Coat Acrylic Gloss Finish 2406G
- e. **Finish No. X-5:** Minimum ODFT 7.0 MILS.
- 1) Piping Galvanized.
 - 2) 1st Coat General Purpose Metal Primer.
 - a) PITT TECH PLUS 4020 "White"
 - 3) 2nd Coat Gloss Enamel Finish:
 - a) PITT TECH PLUS 90-1310
- f. **Finish No. X-6:** Minimum ODFT 11.0 MILS.
- 1) Machinery and Equipment (Coil Coated Products):
 - 2) 1st Coat General Purpose Metal Primer:
 - a) PITT TECH PLUS 4020 "White"
 - 3) 2nd Coat Gloss Enamel PITT TECH PLUS 90-1310
 - 4) 3rd Coat Gloss Enamel PITT TECH PLUS 90-1310
- g. **Finish No. X-7:** Minimum ODFT 7.0 MILS.
- 1) Sheet Metal Ducts:
 - 2) 1st Coat General Purpose Metal Primer:
 - a) PITT TECH PLUS 4020 "White"
 - 3) 2nd Coat 100 percent Acrylic Flat:
 - a) PITT TECH PLUS 90-1310
- h. **Finish No. X-8:** Minimum ODFT 7.0 MILS.

- 1) Fire Hydrants:
- 2) 1st Coat General Purpose Metal Primer
 - a) PITT TECH PLUS 4020 "White"
- 3) 2nd Coat 100 percent Acrylic Flat
 - a) PITT TECH PLUS 90-1310
- i. **Finish No. X-9: Minimum ODFT 7.4 MILS.**
 - 1) Following items listed will receive Finish No. X-9 (including, but not limited to), Louvers, Grilles, or Access Panels.
 - 2) 1st Coat General Purpose Metal Primer:
 - a) PITT TECH PLUS 4020 "White"
 - 3) 2nd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
 - 4) 3rd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
- j. **Finish No. X-10: Minimum ODFT 1.9 MILS.**
 - 1) Striping under Acoustical Board Surrounding Structure:
 - 2) 1st Coat 100 percent Acrylic Flat Black SUNPROOF FLAT 72-Series
- k. **Finish No. X-11: Minimum ODFT 2.2 MILS.**
 - 1) Acoustical Board and Exposed Striping and Structural:
 - 2) 1st Coat 100 percent Acrylic Flat Black SUNPROOF FLAT 72-Series
- l. **Finish No. X-12:**
 - 1) Minimum ODFT as recommended by graffiti coating manufacturer.
 - 2) Graffiti Coating, non-toxic, liquid, sacrificial wax-based Coating:
 - 3) 1st Coat Graffiti Coating:
 - a) Graffiti-Pruf by VISUAL POLLUTION TECH, INC.
 - 4) 2nd Coat Graffiti Coating:
 - a) Only if recommended by manufacturer for substrate material type.
 - b) Graffiti-Pruf by VISUAL POLLUTION TECH, INC.
- m. **Finish No. X-13 (NOT APPLICABLE).**
- n. **Finish No. X-14 (NOT APPLICABLE).**
- o. **Finish No. X-15:**
 - 1) Clear Graffiti Coating, non-toxic, liquid, multi-polymer, non-sacrificial, single component sealer by BASF, or approved equivalent: One Coat
 - a) **NOTE #1:** Test a small area of the existing substrate in an out-of-the-way spot, as determined by the Architect, for compatibility. Inform the Architect if an incompatibility is found for further direction. If found to be compatible, proceed as follows:
 - 2) 1st Coat Clear, flat matte coat TAGGUARD by BASF.
 - a) **NOTE #2:** Follow manufacturer's recommendations for proper installation over various substrates. Applicator must be certified by the manufacturer as an approved applicator for this product over various substrate materials. Protect at least 24 hours minimum the treated surface until manufacturer's recommended curing time has been achieved against graffiti.
 - 3) REMOVAL COAT TAGGUARD Cleaner.
 - a) **NOTE #3:** Provide remover in small containers equal to 8-16 oz. containers of material for the Owner's use. Instruct the designated representative of the Owner as to proper application of the remover, and all procedures for removing graffiti.
- p. **Finish No. X-16: Non-sacrificial, aqueous, silane chemistry, ready-to-use, zero VOC high performance anti-graffiti treatment for masonry, concrete and natural stone, dries clear and will not yellow.**
 - 1) Follow manufacturer's printed recommendations prior to use.
 - 2) Do not apply to wet surfaces. If surface is wet, let dry for a minimum of 24 hours prior to application. Do not use if temperature is below 40 degrees F or above 100 degrees F.

- 3) Protect non-porous surface substrates from overspray. Always do a test patch to confirm the treatment before using to determine if there are any problems prior to full coverage of the porous surfaces.
 - 4) Concrete shall be allowed to cure a minimum of 28 days. All pointing or re-pointing shall be completed and allowed to cure for at least 3 days prior to coverage. All patching materials, caulking, sealing materials and traffic paint shall be fully cured before application.
 - 5) 1st Coat Clear, flat matte coat PROTECTOSIL ANTIGRAFFITI.
 - a) 175 to 250 sq. ft. per gallon, diluted by 14 parts of water, using a 1" nap roller.
 - 6) 2nd Coat Clear, flat matte coat PROTECTOSIL ANTIGRAFFITI.
 - a) 175 to 250 sq. ft. per gallon, un-diluted, using a 1" nap roller.
 - 7) 3rd Coat Clear, flat matte coat PROTECTOSIL ANTIGRAFFITI.
 - a) 175 to 250 sq. ft. per gallon, un-diluted, using a 1" nap roller.
 - b) 3rd Coat shall always be figured in as part of the Base Bid. 3rd Coat may be deleted if it is determined by all concerned that the two coats were sufficient to protect the surfaces. If not needed, then figure on a credit back to the Owner.
 - 8) Most graffiti removal can be achieved with standard non-hazardous cleaners and low-pressure waterblasting. Contact manufacturer for stubborn markings for removal.
- q. **Finish No. X-17: Non-sacrificial, 100 percent active silane treatment with oleophobic additive, clear penetrating breathable VOC Compliant (400 g/L) surface treatment for use on concrete, brick masonry, concrete masonry units and natural stone.**
- 1) For flat (horizontal) concrete walks.
 - a) Manufacturer's printed recommendations for rate of coverage, and type of application method to protect porous surfaces from graffiti and for ease of walk-way clean-up.
 - b) Follow manufacturer's printed recommendations prior to use.
 - c) Do not apply to wet surfaces. If surface is wet, let dry for a minimum of 24 hours prior to application. Do not use if temperature is below 40 degrees F or above 100 degrees F.
 - d) Protect non-porous surface substrates from overspray. Always do a test patch to confirm the treatment before using to determine if there are any problems prior to full coverage of the porous surfaces.
 - e) Concrete surfaces shall be allowed to cure a minimum of 28 days. All pointing or re-pointing shall be completed and allowed to cure for at least 3 days prior to coverage. All patching materials, caulking, sealing materials and paint shall be fully cured before application.
 - 2) 1st Coat Clear, flat matte coat PROTECTOSIL BHN PLUS.
- r. **Finish No. X-18: Non-sacrificial, Graffiti Coating, non-toxic, liquid, semi-permanent, acrylic based Coating - Minimum ODFT as recommended by graffiti coating manufacturer.**
- 1) For application on sealed surface, including but not limited to CMU scheduled to be sealed, verify compatibility with sealer manufacturer prior to application of Sealer.
 - a) Only if recommended by manufacturer for substrate material type.
 - b) For application on natural porous surface, thin first coat with 40 percent water. All other coats shall be full strength.
 - 2) 1st Coat Graffiti Coating TSW4.
 - 3) 2nd Coat Graffiti Coating TSW4.
 - 4) 3rd Coat Graffiti Coating TSW4.
 - 5) 4th Coat Graffiti Coating TSW4.

- 6) Provide Manufacturer's recommended TSW2G Graffiti Removal Kit.
- s. **Finish No. X-19: Intumescent Paint - Minimum ODFT per fire rating required.**
- 1) Primer: Per manufacturer's Written Recommendations, ODFT as required.
 - 2) 1st Coat Water Based Polymer, ISOLATEK INTERNATIONAL "CAFECO Spray Film WB3."
 - 3) 2nd Coat As required if needed - no greater than 62 mils per coat.
 - 4) 3rd Coat As required if needed - no greater than 62 mils per coat.
 - 5) 4th Coat Premium Exterior Latex Semi-Gloss GL68XX in thickness as recommended by manufacturer, and in color as selected by the Architect.
- t. **Finish No. X-20: Pool Paint High Gloss Epoxy - Minimum ODFT Approximately 3.6 mils.**
- 1) Primer: RAMUC "Clean and Prep Solution" per manufacturer's Written Recommendations
 - 2) 1st Coat Pool Paint by RAMUC
 - 3) Finish Coat Pool Paint by RAMUC
- u. **Finish No. X-21: "Resuflor Deco Quartz BC23" Flooring System**
- 1) Surface Preparation:
 - a) N/A.
 - b) Provide shot-blasted or mechanically abraded surfaces (CSP-4-9).
 - c) Prepare any metal substrates per SSPC-SP10 "Near White Metal."
 - d) Threshold preparation: Key in material for flush transition.
 - 2) SHERWIN WILLIAMS / General Polymers, 1/8" Thick "Resuflor Deco Quartz BC23" Flooring System:
 - a) 1st Coat - Primer: SHERWIN WILLIAMS GP3477 Epoxy Water Emulsion Primer / Sealer (Part A and Part B).
 - b) 2nd Coat - Slurry: SHERWIN WILLIAMS Fastop Urethane Slurry 12S-GP4080 with 55lbs GP 5080 aggregate per 1.8-gallon kit. Applied at 3/16, 5900F aggregate broadcast to excess approx. 0.6 lbs. per sq. ft.
 - c) 3rd Coat - Broadcast Alum Oxide: SHERWIN WILLIAMS GP 3744 applied at 100 sq ft per gallon with 5900F aggregate broadcast to excess approx. 0.6 lbs. per sq. ft.
 - d) 4th Coat - Grout Coat: GP 3744 applied at 100 sq. ft per gallon.
 - e) 5th Coat - Finish Coat: GP 3744 applied at 100 sq. ft per gallon
 - 3) Coved Bases: Extend the "Resuflor Deco Quartz BC23" Flooring System up the coved base, to an extent 6" minimum above the finish floor. Terminate the cove material at an existing grout joint, or at the top of the coved wall base.
 - 4) Color: Refer to Appendix B - Interior Color Schedule for color.
 - 5) Flooring Transitions:
 - a) At transitions in the flooring, saw cut a clean joint at the transition and chip out the sub-floor to receive the resinous flooring system to a depth two times (2x) the thickness of the resinous flooring system, and extend it to a distance of 30".
 - b) At Floor Drains / Floor Sinks chip out the sub-floor to receive the resinous flooring system to a depth four times (4x) the thickness of the resinous flooring system, and extend it to a distance of 9".

END OF SECTION

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SECTION 100500 – MISCELLANEOUS SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provision for and installation of specialty and built-in items required for this Work as indicated on the Drawings.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 03 30 00 CAST-IN-PLACE CONCRETE
 4. 04 22 00 CONCRETE MASONRY UNITS
 5. 05 12 00 STEEL AND FABRICATIONS
 6. 05 30 00 METAL DECK
 7. 06 10 00 ROUGH CARPENTRY
 8. 06 41 23 MODULAR CASEWORK
 9. 07 60 00 SHEET METAL
 10. 08 70 00 HARDWARE
 11. 08 80 00 GLASS
 12. 09 11 00 METAL FRAMING
 13. 09 24 00 CEMENT PLASTER
 14. 09 29 00 GYPSUM BOARD
 15. 09 50 00 ACOUSTICAL CEILINGS
 16. 09 65 10 RESILIENT BASE AND ACCESSORIES
 17. 09 72 00 WALL COVERINGS
 18. 09 91 00 PAINTING
 19. 10 26 00 WALL AND CORNER GUARDS
 20. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 21. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SYSTEM DESCRIPTION

- A. Performance Requirements: It is the intention of this section and the drawings to form a guide for a complete and operable system of all products or systems listed within this specification section. Any items not specifically noted but necessary for a complete and operable product or system shall be provided under this section.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Shop Drawings:
 - a. Submit Shop Drawings and catalog cuts to the architect showing all details of installation and assembly and all requirements for work by other trades.
 2. Product Data:

- a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Storage and protection:
 1. Use all means necessary to protect all specialty items before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements:
 1. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

1.5 PROJECT CONDITIONS

- A. Existing Conditions:
 1. Surface Conditions:
 - a. Coordination: Coordinate with all other trades as required to ensure proper and adequate provision in framing and wall finish for the installation of the selected specialties in the locations required.
 2. Inspection:
 - a. Prior to Installation, inspect all specific locations and verify that all necessary provisions have been made.
 - b. In the event of discrepancy, immediately notify the Architect.
 - c. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

1.6 WARRANTY

- A. Contractor's General Warranty:
 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install all specialty items where indicated on the Drawings and in full accordance with all pertinent regulations and the manufacturer's written recommendations, anchoring all components firmly in place for long life under hard use, and in accordance with IR (Interpretation of Regulations, "Division of the State Architect• ") Manual.

3.2 ADJUSTING

- A. Upon completion of the installation, and as a condition of its acceptance, visually inspect the entire work of this Section, adjust all components for proper alignment and use, and touch up all abrasions and scratches to make them completely invisible.

3.3 SCHEDULES

- A. All items shall be as scheduled or approved equivalent items as set forth in the Substitution Section of these specifications, and all provisions of Division 00 - GENERAL CONDITIONS, and the sections of Division 01.
- B. Automated External Defibrillators (AEDs):
 - 1. Philips HeartStart OnSite AED School & Community Value Package.
 - a. Philips HeartStart OnSite AED.
 - b. 8-Year Manufacturer's Warranty.
 - c. Philips Onsite 4 Year Lithium Battery Pack.
 - d. Adult SMART Pads Cartridge.
 - e. Pediatric SMART Pads Cartridge.
 - f. Standard Carry Case.
 - g. User Manual.
 - h. Quick Reference Card.
 - i. AED Wall Cabinet (basic).
 - j. AED Projection Wall Sign.
 - k. CPR/AED Rescue Kit.
 - l. Inspection / Maintenance Tag.
 - m. "AED Equipped Facility" Decal.
 - 2. Provide one (1) unit for the pool complex.
 - a. The location will be on the North wall of building P4, mounted to the CMU wall by the backwash tank.
 - b. Center of cabinet handle to be located 46" maximum from finish floor.
- C. Glassfiber Reinforced Cement Molding
 - 1. Provide and install as shown on the Drawings, Glassfiber Reinforced Cement (GFRC) Column Covers and Caps equal to Polymer Glassfiber Reinforced cement - Formglas EP* units as manufactured by FORMGLAS INC. (local rep. Alan Coote, ph: 415-541-0969), or approved equivalent.

2. Units shall be standard round and half-round shapes with base reveal and segmented closure cap. Units shall be prefabricated with Polymer Glassfiber Reinforced Cement for column cover application. Joints shall be filled flush with material recommended by the column cover manufacturer for exterior use and prepared to present no visible joints. Column covers, caps and joints shall be ready to receive finishes after installation.
3. Fabrication and installation of column covers and caps shall be in accordance with the manufacturer's printed specifications and recommendations.
4. Coordinate related work. Submit samples and Shop Drawings per the manufacture's printed specifications. Finish per the Interior Finish Schedule.
5. Where Glassfiber Reinforced Cement Column Covers installed products are indicated to comply with IR 19-2, include structural computations, material properties and other information needed for analysis that has been marked with theoved inspector's identification mar
6. In accordance with IR 19-2, "a testing and inspection program shall be provided by the design professional in responsible charge, shall be approved by DSA, and shall be referenced on the project Test and Inspection List." Exception: Continuous inspection is not required when plants are currently approved under the PCI Plant Certification Program

D. Dimensional Letters:

1. "Fabricated Metal":
 - a. Provide and install, where shown on the drawings, Dimensional Letters as manufactured by GEMINI INCORPRATED or approved equivalent.
 - 1) Dimensional Letters shall be Solid Cast Aluminum Alloy.
 - 2) Dimensional Letters shall have a "Baked Enamel" finish to match color chip provided by the Architect.
 - 3) Mounting shall be flush mounted with a drilling pattern. Install per manufacturer recommendation.
 - b. Letters shall be mounted with stud with spacer mount for 1/2-inch clearance
 - c. Coordinate solid wood backing at location receiving Dimensional Letters.
 - 1) Submit a sample Dimensional Letter and mounting device in the finish selected. Approval by the Architect is required prior to fabrication and installation of all other letters. Sample, upon approval of the Architect, may be incorporated into the work.
 - 2) Type 1
 - a) Font: Arial - Regular
 - b) Size: 8" high
 - c) Depth: 1"
 - d) Color: As indicated on Exterior Color Schedule
 - 3) Type 2
 - a) Font: Arial - Regular
 - b) Size: 6" high
 - c) Depth: 1/2"
 - d) Color: As indicated on Exterior Color Schedule
 - 4) Type 3
 - a) Font: Arial - Regular
 - b) Size: 2" high
 - c) Depth: 1/2"
 - d) Color: As indicated on Exterior Color Schedule

E. Swimsuit Spinner:

1. Manufacture: SUITMATE, Swimsuit Water Extractor
 - a. Model # EC3,

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- 1) Material: 304-series stainless steel & durable plastic
- 2) Power Rating: 115 V, 60 Hz, 8.6 Amp
- 3) Dimensions: 15" x 15" x 23"
- 4) Weight: 55 lb(s)
- 5) Spin Speed: 3450 RPM
- 6) Motor: 1/3 horsepower
- 7) Cycle Time: 8 seconds
- 8) Power Consumption: 1.82 Watt per Cycle

F. Lock Box: Provide Rapid Entry System Recessed Lock Box as manufactured by KNOX CO. Model #3200-R, Heavy-Duty, Medium Capacity, holds 10 keys maximum, 4" W x 5" H x 3-1/4" D.

G. Fiberglass Floor Grating

1. Manufacturer: American Grating LLC
 - a. Model # I10-40
 - 1) Color: Light Gray
 - 2) Material: Protruded Fiberglass
 - 3) Bar Depth: 1"
 - 4) Open Area: 40%
 - 5) Load Bar Centers: 1"
 - 6) Approximate Weight: 3.60 lbs/ft²
 - 7) Cross Bar Spacing: 6"
2. Calculate overall opening size with screen size. Refer to Manufacturer's installation instructions and obtain rough opening size for the drawings. Overall Length = Width + 24" -up to 12' screens- or Width + 30" -larger than 12' screens. Width and depth of screen housing unit is commonly 9 1/8 inches to 9 5/8 inches, depending on conduit connection location.

END OF SECTION

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SECTION 101400 – IDENTIFYING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install all Identifying Devices Interlocking Metal Signs, , and Decals, materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 03 30 00 CAST-IN-PLACE CONCRETE
 4. 04 22 00 CONCRETE MASONRY UNITS
 5. 06 10 00 ROUGH CARPENTRY
 6. 08 80 00 GLASS
 7. 09 22 16 METAL FRAMING
 8. 09 24 00 CEMENT PLASTER
 9. 09 29 00 GYPSUM BOARD
 10. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 11. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

- A. Definitions pertaining to signage are as follows:
1. Characters Shall mean all letters, numbers, symbols or pictograms.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements for Tactile Signage:
1. Characters and Graphics:
 - a. Finish and Contrast: Characters and their background shall have a non-glare finish. Characters shall contrast with their background, either light characters on a dark background or dark characters on a light background – CBC Section 11B-703.5.1, 11B-703.6.2, and 11B-703.7.1.
 - b. Character Type: Characters on signs shall be raised 1/32 inch (0.794 mm) minimum and letters and numbers shall be sans serif uppercase characters accompanied by contracted (Grade 2) Braille complying with CBC Section 11B-703.3 and Table 11B-703.3.1.
 - c. Character Size: Raised characters (letters and numbers) shall be a minimum of 5/8 inch (15.9 mm) and a maximum of 2 inches (51 mm) high.

- d. Pictorial symbol signs (pictograms): Pictorial symbol signs (pictograms) shall be accompanied by the verbal description placed directly below the pictogram. the outside dimension of the pictogram field shall be a minimum of 6 inches (152 mm) in height.
 - e. Character Placement: Characters and Braille shall be in a horizontal format. Braille shall be placed a minimum of 3/8 inch (9.5 mm) and a maximum of 1/2 inch (12.7 mm) directly below the tactile characters; flush left or centered. When tactile text is multilined, all Braille shall be placed together below all lines of tactile text.
 - f. Proportions: Raised characters on signs shall be selected from fonts where the width of the uppercase letter "O" is 60 percent minimum and 110 percent maximum of the height of the uppercase letter "I." Stroke thickness of the uppercase "I" shall be 15 percent maximum of the height of the character.
 - 1) For Braille Text, capitalization shall conform to CBC Section 11B-703.3.1.
2. Braille:
- a. California Contracted Grade 2 Braille shall be used wherever Braille is required in other portions of these standards. Braille shall accompany all raised characters – CBC Section 11B-703.3 and Table 11B-703.3.1.
 - 1) Dots shall be rounded or domed.
 - 2) Below measured as a minimum in inches and maximum in inches:
 - 3) Dot Base Diameter: 0.059 (1.5 mm) to 0.063 (1.6 mm).
 - 4) Distance between two dots in the same cell (measured center-to-center): 0.100 (2.5 mm).
 - 5) Distance between corresponding dots in adjacent cells (measured center-to-center): 0.300 (7.6 mm).
 - 6) Dot Height: 0.025 (0.6 mm) to 0.037 (0.9 mm).
 - 7) Distance between corresponding dots from one cell directly below:
 - a) 0.395 (10 mm) to 0.400 (10.2 mm).
3. Signs shall be installed on the wall adjacent to the latch side of the door.
- a. Where there is no space on the latch side, including at double leaf doors, signs shall be placed on the nearest adjacent wall, preferably on the right.
 - b. Mounting height shall be as indicated in details on the drawings and in compliance with 11B-703.4.1 and 11B-703.4.2.
4. Inspection: Signage shall be field inspected after installation per CBC 11B-703.1.1.2.
- B. Performance Requirements: It is the intention of this specification section and the drawings to form a guide for a complete, operable system signage system that is compliant with State and Federal Accessibility Regulations. Any items not specifically noted but necessary for a complete, operable and accessible system shall be provided under this section.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
- 1. Product Data.
 - a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect within thirty days of receipt of the NOTICE TO PROCEED.
 - 1) Provide actual 2-inch x 2-inch sample colors and patterns available from the manufacturers for color selection.
 - 2. Shop Drawings.

- a. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work, including accessibility dimensions for mounting heights.
 - b. Submit drawings indicating Room numbers shown on the Contract Documents coordinated with Owner's Room Numbers.
3. Samples.
- a. Provide actual 2-inch x 2-inch sample of each sign type specified.
4. Quality Assurance/Control Submittals:
- a. Certificates:
 - 1) Submit four (4) copies of certificates.
 - 2) Upon completion of the installation, submit a Certificate from the Contractor (on the Contractor's Letterhead) and co-endorsed by the manufacturer/supplier, sub-contractor/installer that the signage supplied for this project requiring braille complies with the California Contracted Grade 2 Braille and the CBC Section 11B-703.3.
 - a) Those attesting to the compliance certificate above shall also acknowledge that they are aware of the Submission Under Penalty Of Perjury per California Government Code Section 12650, et seq, pertaining to false claims, and further know and understand that submission of certification of a false claim may lead to fines, imprisonment and/or other severe legal consequences.
 - b. Manufacturer's Instructions:
 - 1) Submit three (3) copies of manufacturer's instructions.
5. Closeout Submittals in accordance with the following:
- a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - c. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
 - d. Warranty in accordance with Specification Section - WARRANTIES and this section.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications:
 - a. Engage an experienced Installer who has been approved by the manufacturer.
2. Manufacturer's/Supplier's Qualifications:
 - a. Firm's experienced in successfully producing/supplying products similar to those indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:

1. In accordance with Specification Section - Regulatory Requirements, and the following:
 - a. ADA Americans with Disabilities Act of 1990.
 - b. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

- c. CBC California Building Code - California Contracted Grade 2 Braille when required.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 - 1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
- B. Acceptance at Site:
 - 1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
 - 2. Damaged products will not be accepted.
- C. Storage and protection:
 - 1. Products shall be stored in a dry, protected area.
 - 2. Products shall be stored in locked storage building.
 - 3. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials and protect against wetting prior to use.
 - b. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Metal Signs:

- a. KING ARCHITECTURAL PRODUCTS. "KMS Modular Signs."
- 2. Decals:
 - a. SETON NAME PLATE COMPANY.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Metal Signs:
 - 1. Exterior:
 - a. Extruded aluminum signs with a bonded zinc plate having bonded zinc characters, graphics or Braille dots, capable of handling high heat conditions up to 150 degrees facing due West. Front Plate shall be interchangeable. Front Plate and Back Plate shall have interlocking dovetails with locking strip inserts, and vandal resistant 4-40 "allen" set screw for secure application.
 - 1) Characters and Pictograms / Symbols:
 - a) Style: Helvetica Regular upper case.
 - b) Tactile: Raised 1/32" from sign face.
 - c) Braille: California Contracted Grade 2 located below lettering.
 - 2) Perimeter:
 - a) Style: 6 mm square fastening profile top and bottom.
 - b) Corners: Square.
- B. Decals:
 - 1. Provide outdoor grade permanent vinyl material with die cut graphics, characters and self-adhesive back for bonding to clean, smooth surfaces.

2.3 ACCESSORIES

- A. Fasteners:
 - 1. Concealed Attachment: Provide appropriate flathead countersunk stainless steel screws for the substrate backing in which the sign is to be applied.
 - 2. Exposed Attachment – provide appropriate tamper resistant, flathead countersunk stainless steel screws with grommet finish washers for the substrate backing in which the sign is to be applied.
 - 3. Adhesive: "Silastic Adhesive."
 - 4. Foam Tape: SCOTCH MOUNT FOAM TAPE.

2.4 FABRICATION

- A. Shop Assembly:
 - 1. Braille Compliance:
 - a. See Part 1 of this specification – SYSTEM DESCRIPTION, and comply with the "Design Requirements for Tactile Signage" • that requires California Contracted Grade 2 Braille.
 - 2. Metal Signs:

- a. Extrude the Interlocking Metal Signs and backing plates to the sizes and profiles as indicated. Provide bonded plates, graphics, characters and California Contracted Grade 2 Braille Text when required, and assembling all the components and finishing in accordance to the specifications. All components of the signage system shall be ready to install in the field.

2.5 FINISHES

A. Metal Signs:

1. Sign profiles shall be anodized with baked-on acrylic polyurethane matte finish, color as selected by the Architect from the manufacturer's full color line, including any custom colors.
2. Allow for two color application œœ one color for the field, top and bottom rails, and one color for the characters.

B. Decals:

1. Integral non-glare finish from outdoor vinyl and die cut vinyl graphics, characters, in contrasting colors as selected by the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:

1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work specified under this specification section.
2. Contractor to provide internal wall blocking for all attached identifying devices.

B. Protection:

1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:

1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

SECTION 100500 – MISCELLANEOUS SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provision for and installation of specialty and built-in items required for this Work as indicated on the Drawings.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 03 30 00 CAST-IN-PLACE CONCRETE
 4. 04 22 00 CONCRETE MASONRY UNITS
 5. 05 12 00 STEEL AND FABRICATIONS
 6. 05 30 00 METAL DECK
 7. 06 10 00 ROUGH CARPENTRY
 8. 06 41 23 MODULAR CASEWORK
 9. 07 60 00 SHEET METAL
 10. 08 70 00 HARDWARE
 11. 08 80 00 GLASS
 12. 09 11 00 METAL FRAMING
 13. 09 24 00 CEMENT PLASTER
 14. 09 29 00 GYPSUM BOARD
 15. 09 50 00 ACOUSTICAL CEILINGS
 16. 09 65 10 RESILIENT BASE AND ACCESSORIES
 17. 09 72 00 WALL COVERINGS
 18. 09 91 00 PAINTING
 19. 10 26 00 WALL AND CORNER GUARDS
 20. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 21. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SYSTEM DESCRIPTION

- A. Performance Requirements: It is the intention of this section and the drawings to form a guide for a complete and operable system of all products or systems listed within this specification section. Any items not specifically noted but necessary for a complete and operable product or system shall be provided under this section.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Shop Drawings:
 - a. Submit Shop Drawings and catalog cuts to the architect showing all details of installation and assembly and all requirements for work by other trades.
 2. Product Data:

- a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Storage and protection:
 1. Use all means necessary to protect all specialty items before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements:
 1. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

1.5 PROJECT CONDITIONS

- A. Existing Conditions:
 1. Surface Conditions:
 - a. Coordination: Coordinate with all other trades as required to ensure proper and adequate provision in framing and wall finish for the installation of the selected specialties in the locations required.
 2. Inspection:
 - a. Prior to Installation, inspect all specific locations and verify that all necessary provisions have been made.
 - b. In the event of discrepancy, immediately notify the Architect.
 - c. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

1.6 WARRANTY

- A. Contractor's General Warranty:
 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install all specialty items where indicated on the Drawings and in full accordance with all pertinent regulations and the manufacturer's written recommendations, anchoring all components firmly in place for long life under hard use, and in accordance with IR (Interpretation of Regulations, "Division of the State Architect• ") Manual.

3.2 ADJUSTING

- A. Upon completion of the installation, and as a condition of its acceptance, visually inspect the entire work of this Section, adjust all components for proper alignment and use, and touch up all abrasions and scratches to make them completely invisible.

3.3 SCHEDULES

- A. All items shall be as scheduled or approved equivalent items as set forth in the Substitution Section of these specifications, and all provisions of Division 00 - GENERAL CONDITIONS, and the sections of Division 01.
- B. Automated External Defibrillators (AEDs):
 - 1. Philips HeartStart OnSite AED School & Community Value Package.
 - a. Philips HeartStart OnSite AED.
 - b. 8-Year Manufacturer's Warranty.
 - c. Philips Onsite 4 Year Lithium Battery Pack.
 - d. Adult SMART Pads Cartridge.
 - e. Pediatric SMART Pads Cartridge.
 - f. Standard Carry Case.
 - g. User Manual.
 - h. Quick Reference Card.
 - i. AED Wall Cabinet (basic).
 - j. AED Projection Wall Sign.
 - k. CPR/AED Rescue Kit.
 - l. Inspection / Maintenance Tag.
 - m. "AED Equipped Facility" Decal.
 - 2. Provide one unit in each building.
 - a. Verify installation location with the owner prior to installation.
 - b. Center of cabinet handle to be located 46" maximum from finish floor.
- C. Glassfiber Reinforced Cement Moldering
 - 1. Provide and install as shown on the Drawings, Glassfiber Reinforced Cement (GFRC) Column Covers and Caps equal to Polymer Glassfiber Reinforced cement - Formglas EP* units as manufactured by FORMGLAS INC. (local rep. Alan Coote, ph: 415-541-0969), or approved equivalent.

2. Units shall be standard round and half-round shapes with base reveal and segmented closure cap. Units shall be prefabricated with Polymer Glassfiber Reinforced Cement for column cover application. Joints shall be filled flush with material recommended by the column cover manufacturer for exterior use and prepared to present no visible joints. Column covers, caps and joints shall be ready to receive finishes after installation.
3. Fabrication and installation of column covers and caps shall be in accordance with the manufacturer's printed specifications and recommendations.
4. Coordinate related work. Submit samples and Shop Drawings per the manufacture's printed specifications. Finish per the Interior Finish Schedule.
5. Where Glassfiber Reinforced Cement Column Covers installed products are indicated to comply with IR 19-2, include structural computations, material properties and other information needed for analysis that has been marked with theoved inspector's identification mar
6. In accordance with IR 19-2, "a testing and inspection program shall be provided by the design professional in responsible charge, shall be approved by DSA, and shall be referenced on the project Test and Inspection List." Exception: Continuous inspection is not required when plants are currently approved under the PCI Plant Certification Program

D. Dimensional Letters:

1. "Fabricated Metal":
 - a. Provide and install, where shown on the drawings, Dimensional Letters as manufactured by GEMINI INCORPRATED or approved equivalent.
 - 1) Dimensional Letters shall be Solid Cast Aluminum Alloy.
 - 2) Dimensional Letters shall have a "Baked Enamel" finish to match color chip provided by the Architect.
 - 3) Mounting shall be flush mounted with a drilling pattern. Install per manufacturer recommendation.
 - b. Letters shall be mounted with stud with spacer mount for 1/2-inch clearance
 - c. Coordinate solid wood backing at location receiving Dimensional Letters.
 - 1) Submit a sample Dimensional Letter and mounting device in the finish selected. Approval by the Architect is required prior to fabrication and installation of all other letters. Sample, upon approval of the Architect, may be incorporated into the work.
 - 2) Type 1
 - a) Font: Arial - Regular
 - b) Size: 8" high
 - c) Depth: 1"
 - d) Color: As indicated on Exterior Color Schedule
 - 3) Type 2
 - a) Font: Arial - Regular
 - b) Size: 6" high
 - c) Depth: 1/2"
 - d) Color: As indicated on Exterior Color Schedule
 - 4) Type 3
 - a) Font: Arial - Regular
 - b) Size: 2" high
 - c) Depth: 1/2"
 - d) Color: As indicated on Exterior Color Schedule

E. Swimsuit Spinner:

1. Manufacture: SUITMATE, Swimsuit Water Extractor
 - a. Model # EC3,

**MISCELLANEOUS
SPECIALTIES**

2180

- 1) Material: 304-series stainless steel & durable plastic
- 2) Power Rating: 115 V, 60 Hz, 8.6 Amp
- 3) Dimensions: 15" x 15" x 23"
- 4) Weight: 55 lb(s)
- 5) Spin Speed: 3450 RPM
- 6) Motor: 1/3 horsepower
- 7) Cycle Time: 8 seconds
- 8) Power Consumption: 1.82 Watt per Cycle

F. Lock Box: Provide Rapid Entry System Recessed Lock Box as manufactured by KNOX CO. Model #3200-R, Heavy-Duty, Medium Capacity, holds 10 keys maximum, 4" W x 5" H x 3-1/4" D.

G. Fiberglass Floor Grating

1. Manufacturer: American Grating LLC
 - a. Model # I10-40
 - 1) Color: Light Gray
 - 2) Material: Protruded Fiberglass
 - 3) Bar Depth: 1"
 - 4) Open Area: 40%
 - 5) Load Bar Centers: 1"
 - 6) Approximate Weight: 3.60 lbs/ft²
 - 7) Cross Bar Spacing: 6"
2. Calculate overall opening size with screen size. Refer to Manufacturer's installation instructions and obtain rough opening size for the drawings. Overall Length = Width + 24" -up to 12' screens- or Width + 30" -larger than 12' screens. Width and depth of screen housing unit is commonly 9 1/8 inches to 9 5/8 inches, depending on conduit connection location.

END OF SECTION

1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. ADA Americans with Disabilities Act.
 - b. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - c. CBC California Building Code, all accessible parking signage shall be as required by CBC 11B-502.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
- B. Acceptance at Site:
 1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
 2. Damaged products will not be accepted.
- C. Storage and protection:
 1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.5 PROJECT CONDITIONS

- A. Existing Conditions:
 1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
 2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.6 WARRANTY

- A. Contractor's General Warranty:
 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 1. In accordance with the terms of the Specification Section - WARRANTIES:

- a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Signage material:
 1. Signs shall be permanent and reflectorized, constructed of porcelain coating on steel with beaded text or approved equivalent.
 2. Sign materials shall be hot-dipped galvanized, embossed steel, with a heavy-duty baked enamel finish.
 - a. 16 gage steel for all signs larger than 24" x 24".
 - b. 18 gage steel for all signs smaller than 24" x 24".
- B. Brackets:
 1. Galvanized Pipe, attached with vandal resistant fasteners.
 - a. Provide Owner with tool that is compatible with vandal resistant fasteners so that maintenance can be performed on the signs.
- C. Posts:
 1. Pipe, galvanized, Schedule 40, in accordance with ASTM A 53 "Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless," with compatible galvanized Dome Caps.
- D. Concrete:
 1. See Specification Section – CAST-IN-PLACE CONCRETE.
- E. Other Materials:
 1. Materials not specifically indicated but needed for proper installation shall be new and of first quality as selected by contractor subject to review by the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
 1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 INSTALLATION

- A. General:

- 1. In accordance with Regulatory Requirements.
- 2. Set plumb, level, and square.
 - a. Set post plumb and at proper height.
 - b. Place concrete and tamp to assure consolidation.
 - 1) Footings shall be 8" in diameter, 24 inches deep minimum, unless otherwise noted.
 - 2) Top of concrete shall be 3-1/2 inches below finished grade.
 - c. Install brackets so signs are plumb and level.
 - d. The accessible signage shall be centered at the interior end of the parking space at a minimum height of 80 inches from the bottom of the sign to the parking space finished grade, ground or sidewalk.
 - 1) In lieu of posts, the accessible parking space signage may also be centered on the wall at the interior end of the parking space (if applicable) at a minimum of 60 inches from the parking space finished grade, ground or sidewalk. Verify with Architect before using this option.

3.3 SCHEDULE

A. Parking Entrance Accessible Sign:

- 1. A sign shall be posted in a conspicuous place at each entrance to off-street parking facilities.
 - a. The sign shall be not less than 17 inches x 22 inches in size with lettering not less than one inch in height, which clearly and conspicuously states the following:
- 2. Sign Verbiage:

"Unauthorized vehicles parked in designated accessible spaces not displaying distinguishing placards or special license plates issued for persons with disabilities will be towed away at owner's expense. Towed vehicles may be reclaimed at

_____ * _____ or by _____ * _____

telephoning _____ * _____.

"Owner of Project to provide information as a permanent part of the sign. Sign provider to verify information needed with owner prior to fabrication."

B. Parking Stall Accessible Sign:

- 1. Each parking space reserved for the disabled shall be identified by a permanently affixed reflectorized sign and a minimum fine of \$250.00.
 - a. Sign shall display the International Symbol of accessibility shall be white reflectorized symbol and border on blue background. See drawings for overall size.
 - b. Add van accessible sign to the parking space identified on the contract drawings. See drawings for overall size.
 - 1) Van accessible sign shall have 1" high white letters, 1/2" white border on blue background.

C. Directional Accessible Sign:

- 1. 12" x 18" with International Symbol of Accessibility, 1" high letters that say "PERSONS WITH DISABILITIES PARKING," and directional arrow.
 - a. Arrow shall be square tip style.

b. Symbols and lettering shall be white reflectorized characters on blue background.

D. Stop Sign:

- 1. Stop Sign in accordance with traffic standards in the area where the project is located:
- 2. 18" x 18" eight sided sign, 6" high letters that say "STOP."
 - a. Lettering shall be white reflectorized characters on RED background.

E. Bus Entrance Sign:

- 1. A sign shall be posted in a conspicuous place at each side of the bus drop-off area.
 - a. The sign shall be not less than 17 inches x 22 inches in size with lettering not less than one inch in height, which clearly and conspicuously states the following:

2. Sign Verbiage:

"Unauthorized vehicles parked in the bus drop-off area will be towed away at owner's expense. Towed vehicles may be reclaimed at

_____ * _____ or by _____ * _____

telephoning _____ * _____."

"Owner of Project to provide information as a permanent part of the sign. Sign provider to verify information needed with owner prior to fabrication."

F. Bus Entrance Only Sign:

- 1. 12" x 18", 1-1/2" high letters that say "BUS ENTRANCE ONLY."
- 2. Lettering shall be red on white background.

G. Do Not Enter Sign:

- 1. 12" x 18", 2" high letters that say "DO NOT ENTER."
- 2. Lettering shall be white reflectorized characters on red background.

H. Gate Sign:

- 1. 12" x 18", 1" high letters that say:
 - a. "OPERATED BY SECURITY PERSONNEL ONLY."

I. No Parking Sign:

- 1. 12" X 18", 1-1/2" high letters that say:
 - a. "NO PARKING, BUS PARKING ONLY."
- 2. Lettering shall be red on white background.

J. Fire Riser Room Route Sign:

- 1. 12" x 18", 1-1/2" high letters that say "FIRE RISER ROOM ROUTE."
 - a. Lettering shall be white reflectorized characters on red background.

END OF SECTION

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SECTION 102113 – TOILET PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install all Toilet Partition materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - a. High Density Polyethylene (HDPE) Plastic Toilet Partition Systems.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 03 30 00 CAST-IN-PLACE CONCRETE
 4. 04 22 00 CONCRETE MASONRY UNITS
 5. 06 10 00 ROUGH CARPENTRY
 6. 09 24 00 CEMENT PLASTER
 7. 09 29 00 GYPSUM BOARD
 8. 09 91 00 PAINTING
 9. 10 28 13 TOILET ACCESSORIES
 10. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

- A. In accordance with the following:
1. AWS American Welding Society

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data:
 - a. Submit manufacturer's full color range (including any standard and premium colors) for selection by the Architect.
 - b. Submit manufacturer's technical data.
 2. Shop Drawings:
 - a. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachment to other units of work.
 3. Samples:
 - a. Provide two (2) 4 inch square samples of each color selected.
 - b. Provide hardware samples on request.
 4. Certificates:
 - a. Provide third party certification that all products comply with NFPA 286.
 5. Closeout Submittals in accordance with the following:

- a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
- b. Project Documents in accordance with Specification Section - PROJECT DOCUMENTS.
- c. Warranty in accordance with Specification Section - WARRANTIES and the article in this section titled "Special Warranty."

1.4 QUALITY ASSURANCE

- A. Qualifications:
 1. Installer Qualifications:
 - a. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product in accordance with manufacturer's warranty requirements.
 2. Manufacturer Qualifications:
 - a. Firm experienced in successfully producing products similar to that indicated for this Project, with sufficient production capacity to supply required units without causing delay in the work.
- B. Regulatory Requirements:
 1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. CBC Chapter 11B Accessibility to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing:
 - 1) Furnish Door Hardware for each accessible stall to comply with ANSI A 117.1 and the CBC Section 11B.
 - 2) Toe Clearance Requirements:
 - a) Toe Clearance shall be in accordance with CBC Section 11B-604.8.1.4 - at least one side partition shall provide a toe clearance of 9 inches (229 mm) minimum above the finish floor and 6 inches (152 mm) deep minimum beyond the compartment-side face of the partition, exclusive of partition support members. Partition components at the clearances shall be smooth without sharp edges or abrasive surfaces.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 1. Products shall be individually wrapped.
 2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
- B. Acceptance at Site:
 1. Products must be in manufacturer's original unopened containers with labels indicating brand name and model.
 2. Damaged products will not be accepted.

- C. Storage and protection:
 - 1. Products shall be stored in a locked, dry and protected area.

1.6 PROJECT CONDITIONS

- A. Existing Conditions:
 - 1. Examine the project and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.7 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period for Solid Plastic Systems Fifteen (15) Years.
 - b. Upon project completion and acceptance, the subcontractor shall issue Owner a warranty against defective workmanship and materials.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified Solid Plastic Toilet Partition product manufacturer:
 - a. SCRANTON Products, includes:
 - 1) CAPITOL PARTITIONS
 - 2) COMTEC INDUSTRIES, INC.
 - 3) SANTANA PRODUCTS COMPANY
 - b. Acceptable alternative manufacturer:
 - 1) ACCURATE PARTITIONS CORPORATION.
 - 2) LAMINATING TECHNOLOGIES.

- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Solid Color Reinforced Composite: all edges eased, tested in accordance with CBC 803.1.2, 803.12 and ASTM standards as follows:
1. ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials."
 - a. Flame Spread: 69.
 - b. Smoke Density: 93.
 2. Heat Sinc: Provide continuous aluminum edging strips fastened to the bottom edge at full width of doors, screens and panels.
 3. Provide concealed mounting-- no exposed screw heads on exterior.
 - a. Model Number suffix .67.
- B. Solid Plastic: Provide high density polyethylene (HDPE) solid polymer resin with homogeneous color throughout, 1 inch thick with seamless construction and all edges eased, tested in accordance with CBC 803.1.2, 803.13, NFPA 286 (Class A) and ASTM standards as follows:
1. PHYSICAL PROPERTIES:
 - a. Smoke Density per ASTM D 2843 "Test Method for Density of Smoke from the Burning or Decomposition of Plastics":
 - 1) 75 maximum.
 - b. Self Ignition per ASTM D 1929 "Test Method for Determining Ignition Temperature of Plastics":
 - 1) 650 degrees minimum.
 - c. Rate of Burn per ASTM D 635 "Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position":
 - 1) 2.0 cm/min maximum.
 - d. Density per ASTM D 1505 "Test Method for Density of Plastics by the Density-Gradient Technique":
 - 1) 0.96 g/cc.
 - e. Tensile Yield per ASTM D 638 "Test method for Tensile Properties of Plastics":
 - 1) 4400 psi.
 - f. Elongation per ASTM D 638 "Test method for Tensile Properties of Plastics":
 - 1) 600 percent minimum.
 - g. Izod Impact per ASTM D 256 "Test methods for Determining the Izod Pendulum Impact Resistance of Plastics".
 - 1) 7.0 ft-lb/inch of notch.
 - h. Tensile Impact per ASTM D 1822 "Test Method for Tensile-Impact Energy to Break Plastics and Electrical Insulating Materials":
 - 1) 120 ft-lb/in².
 - i. Brittleness Temp. per ASTM D 746 "Test Method for Brittleness of Plastics and Elastomers by Impact":
 - 1) 76 degrees C maximum.
 - j. Hardness per ASTM D 2240 "Standard Test Method for Rubber Property – Durometer Hardness":
 - 1) 68 Shore D.

- k. Flexural Modulus per ASTM D 256 "Test methods for Determining the Izod Pendulum Impact Resistance of Plastics":
 - 1) 220,000 psi.
2. Heat Sinc: Provide continuous aluminum edging strips fastened to the bottom edge at full width of doors, screens and panels.

2.3 COMPONENTS

- A. Unless otherwise stated below, all materials shall be Stainless Steel.
- B. Hardware:
 1. General:
 - a. Provide manufacturer's standard stainless steel, ASTM A 666 "Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar," Type 302 or 304, 18 gage minimum, #4 finish, unless otherwise noted.
 - b. Provide Extruded Aluminum, 6063 T-5 parts with a minimum 0.125 inch wall thickness, at Head Rails and Head Rail Endcaps.
 2. Hinges: Integral type consisting of :
 - a. Top Pin: 4 inch long, 1/2 inch diameter nylon.
 - b. Lower Pin: "Cam Action" nylon assembly that provides "self-closing feature" for the door with 3/16 inch diameter stainless steel pin inserted in upper cam in accordance with CBC Section 11B-604.8.1.2.
 3. Door Strike and Keeper:
 - a. Provide surface-mounted door strike and latch keeper for appropriate edge condition and coordinate with latch.
 4. Latch:
 - a. Provide surface-mounted, stainless steel slide latch conforming to accessibility requirements and pilaster and door conditions.
 5. Door Bumper and Hook:
 - a. At in-swinging stall doors provide surface-mounted combination hook and rubber-tipped door bumper sized to prevent door hitting mounted accessories.
 - b. At out-swinging stall doors provide surface-mounted rubber-tipped door bumper sized to prevent door hitting mounted accessories.
 - c. All hooks shall be mounted at +48" maximum AFF.
 6. Door Pull in accordance with CBC Section 11B-404.2.7:
 - a. At stalls that are not identified as accessible, provide manufacturer's standard door pulls.
 - b. At stalls that are identified as accessible, provide pull (or latch assembly) equipped with a loop or "U" Shaped door pull immediately below the latch on both sides of the door conforming to the Americans with Disabilities Act. The latch shall be the sliding, or other hardware not requiring the user to grasp, twist or pinch.
 7. Wall Bumper:
 - a. At out-swinging stall doors provide wall bumper with a rubber face.
 8. Pilaster Shoes and Sleeves (Caps): 3-inches high, finished to match hardware.
 - a. Furnish galvanized steel supports and leveling bolts at pilasters as recommended in writing by manufacturer to suit floor conditions. Make provisions for setting and securing continuous, extruded aluminum, antigrip, overhead bracing at top of each pilaster with a single crown to prevent the hiding of contraband. Provide shoe at each pilaster to conceal anchorage.

9. Wall Brackets - provide continuous length of panel, one-ear brackets and two-ear brackets as required.
10. Panel to Pilaster Brackets - provide continuous length of panel, "U" Shaped brackets.
11. Stirrup Brackets- provide one-ear brackets, two-ear brackets, and "U" Shaped brackets as required.
12. Head Rails - provide aluminum, anti-grip profile.
13. Head Rail Brackets - provide aluminum brackets compatible with Head Rail design.
14. Head Rail Endcaps - provide aluminum endcaps compatible with Head Rail design.

2.4 ACCESSORIES

A. Fasteners:

1. Provide manufacturer's standard stainless steel exposed fasteners finished to match hardware, with theft-resistant heads and nuts. For concealed anchors, use hot-dip galvanized, or other rust-resistant protective coated steel.

2.5 FABRICATION

A. Toilet Partition Design shall be as follows:

1. Floor-Anchored and Overhead-Braced.

B. Furnish standard doors, panels, screens, and pilasters fabricated for toilet partition system.

Units shall be furnished with cutouts, drilled holes, and reinforcement to receive partition-mounted hardware, accessories, and grab bars, as indicated on the drawings. Coordinate with Specification Section - TOILET ACCESSORIES, and schedule reinforcements for products actually provided for this project.

1. Doors, panels, and screens shall be 55 inches high and mounted 12 inches above finished floor.
2. Pilasters shall be 82 inches high.
3. Unless otherwise indicated, furnish 24 inch wide in-swinging doors for non-accessible stalls, and 34 inch wide out-swinging doors for front opening accessible stalls.
 - a. 36 inch for side opening accessible stalls.
4. Furnish galvanized steel supports and leveling bolts at pilasters as recommended in writing by manufacturer to suit floor conditions. Provide Pilaster Shoes to conceal anchorage.
5. Secure floor-anchored-overhead braced pilasters by providing continuous Head Rails with Head Rail brackets, and Head Rail Endcaps.
6. All floor anchoring requires a solid two inches thick of solid flooring for proper anchorage.

C. Urinal Screens: Wall mounted screens of the same construction and finish as toilet partitions.

2.6 FINISHES

A. Finish: Orange Peel.

B. Color shall be selected from the manufacturer's full color range including standard and premium colors.

- C. One color will be selected per room.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
 - 1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
 - 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 - 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Coordination:
 - 1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
 - 2. Coordinate the blocking required in all walls with approved shop drawings.
- B. Protection:
 - 1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
- C. Surface preparation:
 - 1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
 - 2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) that could impair bond of materials specified within this section.

3.3 INSTALLATION

- A. General:
 - 1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
 - 2. In accordance with approved submittals.
 - 3. In accordance with Regulatory Requirements.
 - 4. Set plumb, level, and square.
 - 5. Structurally reinforce and anchor work as required.
 - 6. Panels that contain patched holes not utilized for attachment to walls and pilasters will be rejected by the Architect.
- B. Layout:
 - 1. Lines shall be straight and true.
 - 2. Stalls:

- a. Provide clearances of not less than 1/2 inch between pilasters and panels, and not more than 1 inch between pilasters/panels and walls.
 - b. Secure panels to walls with continuous brackets.
 - c. Secure panels to pilasters with continuous brackets. Brackets are to align with continuous brackets at walls.
 - d. Locate wall brackets so that holes for wall anchorages occur in masonry or tile joints.
 - e. Secure panels to pilasters with not less than two stirrup brackets located to align with stirrup brackets at wall.
 - f. Secure panels in position with manufacturer's written recommended anchoring devices.
 - g. Secure pilasters to floor and level and plumb, and tighten installation with devices furnished.
 - h. Secure head rails to each pilaster with not less than two fasteners.
 - i. Hang doors and adjust so that tops of doors are parallel with head rail when doors are in a closed position. Clearance at vertical edge of doors shall be uniform top and bottom and shall not exceed 1/4 inch.
 - j. When wainscoting prevents the uninterrupted use of a continuous bracket, secure panels to walls with a continuous bracket to the top of the wainscoting and secure the top of the panels to the wall with a stirrup bracket.
3. Screens:
- a. Secure panels to walls with continuous brackets.
 - b. Provide clearances of not more than 1 inch between panels and walls.
 - c. Secure panels in position with manufacturer's written recommended anchoring devices to suit supporting structure.
 - d. Set units to provide support and to resist lateral impact.

3.4 ADJUSTING

- A. Adjust and lubricate for proper operation.
- B. Doors:
1. Adjust and set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched.
 2. Adjust and set hinges on out-swinging doors (and entrance swinging doors) to return fully closed positions.
 3. Adjust and set hinges on doors at accessible stalls to return to fully closed positions.

3.5 CLEANING

- A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean exposed surfaces using materials and methods recommended in writing by manufacturer.
 2. Protect as necessary to prevent damage during the remainder of the construction period.

END OF SECTION

SECTION 102600 – WALL AND CORNER GUARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all Wall and Corner Guard materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 09 24 00 CEMENT PLASTER
 - 4. 09 29 00 GYPSUM BOARD
 - 5. 09 72 00 WALL COVERINGS
 - 6. 09 91 00 PAINTING
 - 7. 10 05 00 MISCELLANEOUS SPECIALTIES
 - 8. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 9. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. Standards:
 - 1. In accordance with the following standards:
 - a. ASTM American Society of Testing Materials
 - b. NFPA National Fire Protection Association

1.3 SYSTEM DESCRIPTION

- A. Design Requirements: In accordance with allowable values and properties assigned and approved by CBC.

- B. Performance Requirements: It is the intention of this section and the drawings to form a guide for a complete and operable system. Any items not specifically noted but necessary for a complete and operable system shall be provided under this section.
 - 1. Fire Performance Characteristics.
 - a. Class A under ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials":
 - 1) Flame Spread: 25 or less.
 - 2) Smoke Developed: 450 or less.
 - 2. Impact Strength:

- a. Provide rigid sheet materials that have an Impact Strength of 30.4 ft-lbs/inch of thickness as tested in accordance with the procedures specified in ASTM D 256 "Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics."
3. Chemical and Stain Resistance
 - a. Provide wall protection system components with chemical and stain resistance in accordance with ASTM D 543 "Practices for Evaluating the Resistance of Plastics to Chemical Reagents."
4. Fungal and Bacterial Resistance:
 - a. Provide material that does not support fungal or bacterial growth as tested in accordance with ASTM G 21 "Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi."
5. Color Consistency:
 - a. Provide components matched in accordance with SAE J-1545 – (Delta E) with a color difference no greater than 1.0 units using CIE Lab, CIE CMC, CIE LCh, Hunter Lab or similar color space scale systems.
6. Accessibility Compliance:
 - a. Comply with ADA requirements and requirements of ANSI A117.1.

1.4 SUBMITTALS

- A. Submit in accordance with Project Manual Specification Section - SUBMITTAL PROCEDURES:
 1. Coordination Drawings:
 - a. Submit installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.
 2. Product Data.
 - a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
 - 1) Provide data for each type of rigid vinyl kickplates specified.
 3. Shop Drawings.
 - a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
 4. Samples.
 - a. Provide 8" square sample of each color and pattern selected.
 - b. Provide 6 inch lineal samples of each piece of trim material specified.
 5. Closeout Submittals in accordance with Project Manual Division 1 Sections:
 - a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - b. Project Record Documents in accordance with Specification Section - PROJECT RECORD Documents.
 - c. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 1. Installer Qualifications:

- a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

B. Regulatory Requirements:

1. In accordance with Project Manual Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. ADA Americans with Disabilities Act of 1990.
 - b. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:

1. Products shall be individually wrapped.
2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:

1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and protection:

1. Products shall be stored in a dry, protected area.

1.7 PROJECT CONDITIONS

A. Environmental requirements:

1. Temperature: acclimate products in environment between sixty-five (65) degrees Fahrenheit and seventy (70) degrees Fahrenheit for one (1) day prior to installation.

B. Existing Conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.8 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.

- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified product manufacturer, or approved equivalent:
 - a. INPRO CORPORATION
 - b. KOROSEAL (Division of RJF INTERNATIONAL CORPORATION)
 - c. Acceptable alternative manufacturers:
 - 1) ACROVYN as manufactured by The C/S GROUP
 - 2) KOROSEAL (Division of RJF INTERNATIONAL CORPORATION)
- B. Products from other manufacturers not listed must submit in accordance with Project Manual Specification Section - SUBSTITUTION PROCEDURES.

2.2 MANUFACTURED UNITS

- A. Corner Guards:
 - 1. Vinyl/Acrylic Flush Corner Guards:
 - a. INPRO Model # 160 (2 inch x 2 inch x 8 feet):
 - 1) When wall height exceeds maximum length available (12 feet), splice to be placed near the ceiling at the highest point practical for full height installation.
 - 2) Provide manufacturer's standard Vinyl/Acrylic extrusions in a nominal wall thickness of 0.080".
 - 3) Finish to be manufacturer's matte "Pebblette" finish in color as selected by Architect from manufacturer's full color range.
 - 4) Chemical and stain resistance shall be in accordance CSAV-280 standards, established by the manufacturer.
 - 5) Provide continuous aluminum retainer 0.070" nominal thickness including attachment of hardware for a complete assembly.
- B. High Impact Wall Covering:
 - 1. High Impact Wall Covering:
 - a. INPRO "Rigid Vinyl Sheet" Item protective wall covering panels in sizes indicated on the drawings.
 - 1) Provide manufacturer's standard vinyl/ acrylic extrusions in a nominal wall thickness of 0.060".

- 2) Provide manufacturer's recommended adhesive for the substrate material indicated on the drawings.
- 3) Finish to be manufacturer's matte "Pebblette" finish in color as selected by Architect from manufacturer's full color range.
- 4) Provide the manufacturer's recommended trim pieces and fabricated configurations as required by the drawings.

2.3 COMPONENTS

- A. End caps, outside corners and inside corners shall be made of injection molded thermoplastics.
1. Joints:
 - a. Inside Corners: Color to match wall protection.
 - b. Joint Sealants: Color to match wall protection.

2.4 ACCESSORIES

- A. All mounting system accessories appropriate for substrates indicated on the drawings shall be provided.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual, which affect the execution of work under this specification section.
 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 INSTALLATION

- A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
 - a. Provide continuous blocking in walls of similar materials as the wall construction to properly anchor the continuous handrail system at the height indicated on the drawings. Fasteners shall be placed at 32" o.c. maximum.
 2. In accordance with approved submittals.
 3. In accordance with Regulatory Requirements.
 4. Set plumb, level, and square.
- B. Minimum temperature requirements for all products must be +70 deg. F. Relative humidity shall not exceed 80 percent.
- C. Layout:

1. Lines shall be straight and true.

3.3 CLEANING

- A. Clean in accordance with Project Manual Specification Section - PROJECT CLOSEOUT.
 1. Clean any soiled surfaces immediately.
 2. Clean any soiled surfaces at the end of each day, minimum.
 3. In accordance with manufacturer's written instructions and recommendations.

END OF SECTION

SECTION 102813 – TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Furnish all material, labor, equipment and services necessary to furnish Toilet Accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 04 22 00 CONCRETE MASONRY UNITS
 4. 08 80 00 GLASS
 5. 09 22 16 METAL FRAMING
 6. 09 24 00 CEMENT PLASTER
 7. 09 29 00 GYPSUM BOARD
 8. 09 30 13 TILE
 9. 09 72 00 WALL COVERINGS
 10. 10 21 13 TOILET PARTITIONS
 11. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data.
 2. Shop Drawings.
 - a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location (including ADA Required dimensions for mounting locations), and size of each field connection.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. ADA American's with Disabilities Act 1990.
 - b. ANSI American National Standards Institute Specifications ANSI A117.1 "Accessible and Usable Buildings and Facilities".
 - c. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located

- d. CBC California Building Code (California State Building Standards Code - Title 24) and the latest edition of DSA's California Access Compliance Advisory Reference Manual.

1.4 WARRANTY

- A. Contractor's General Warranty:
 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

- A. See Schedule in PART 3.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All Toilet Room Accessories shall be furnished and installed by the Contractor, in accordance with manufacturer's written recommendations, and in accordance with accessibility mounting height.
- B. Install in accordance with CBC and ADA Accessibility Chapters and Sections, and ANSI A 117.1.

3.2 SCHEDULES

- A. All devices listed herein shall be installed where shown, complete, and ready for use in full compliance with all applicable codes and standards. The manufacturers listed are acceptable as approved suppliers to the Owner. Substitution of manufacturers other than those listed, must be approved by the Owner.
 1. Hand Dryers (Boys and Girls Restroom and Shower)
 - a. Automatic sensor activated hand dryer, brushed stainless steel cover, 71 dBA Sound Level, 1.7 kW rated power, ADA-compliant 4" projection.
 - 1) BOBRICK, "QuietDry Series," "Trim Dry" surface mounted ADA Dryer, Model #B-7128.
 2. Paper Towel Dispenser:
 - a. Surface mounted, manual operation, satin finish stainless steel. Dispenses 400 c-fold or 525 multi-fold paper towels. Door has tumbler lock and piano hinge. Dimensions: 10 3/4 inches wide, 14 inches high, 4 inches deep. Provide manufacturer's accessory to facilitate single-towel dispensing.

- 1) Acceptable Manufacturers:
 - a) BOBRICK B-262 (Classic Series) with 262-130 "TowelMate."
3. Soap Dispenser:
 - a. Automatic Wall-Mounted Touchless Soap Dispenser.
 - 1) Bobrick B-2012
 - 2) Battery Operated.
 - 3) 10 1/2" Tall, 4 3/16" wide x 4" deep
4. Seat Cover Dispenser:
 - a. Surface mounted, satin finish type-304 22-gage stainless steel. Capacity of 250 toilet seat covers or one box. Dispenser fills from bottom through concealed opening. Ensure 5 inches minimum clearance from bottom of dispenser to top of any horizontal projection to provide room for filling dispenser from bottom.
 - 1) Acceptable Manufacturers:
 - a) BOBRICK B-221 (Classic Series).
 - b) BRADLEY 5831.
5. Toilet Tissue Dispenser (All Boys and Girls Restrooms):
 - a. Accessible Stalls: Recessed multi-roll toilet tissue dispenser shall be Type 304, 22 gage stainless steel with all-welded construction; exposed surfaces shall have satin finish.
 - 1) The front of toilet tissue dispenser shall be drawn, one-piece, seamless construction. Door shall be secured to cabinet with two rivets and equipped with a tumbler lock keyed like other manufacturer's washroom accessories.
 - 2) Flange shall be drawn, one-piece, seamless construction. Unit shall dispense two standard-core toilet tissue rolls up to 5-1/4" diameter.
 - 3) Extra roll shall automatically drop in place when bottom roll is depleted. Unit shall be equipped with two theft-resistant, heavy-duty, one-piece, molded ABS non-controlled delivery spindles.
 - 4) Manufacturer's service and parts manual shall be provided to the building owner / manager upon completion of the project.
 - 5) Toilet Tissue Dispenser shall not protrude into accessible space no more than 3" from the face of the wall.
 - 6) Acceptable manufacturers:
 - a) BOBRICK B-3888 -- 2-3/4" protrusion maximum.
 - b. Non-accessible Stalls: Controlled delivery, dual roll, heavy-duty cast aluminum, satin finish, with high-impact plastic spindle with concealed locking device, theft-resistant, 13" wide, projects 4-1/4" from wall, surface mounted.
 - 1) Acceptable manufacturers:
 - a) BOBRICK B-274.
 - b) BRADLEY 5241.
6. Toilet Tissue Dispenser (All Men and Women's Restrooms):
 - a. Accessible Stalls: Recessed multi-roll toilet tissue dispenser shall be Type 304, 22 gage stainless steel with all-welded construction; exposed surfaces shall have satin finish.
 - 1) The front of toilet tissue dispenser shall be drawn, one-piece, seamless construction. Door shall be secured to cabinet with two rivets and equipped with a tumbler lock keyed like other manufacturer's washroom accessories.
 - 2) Flange shall be drawn, one-piece, seamless construction. Unit shall dispense two standard-core toilet tissue rolls up to 5-1/4" diameter.
 - 3) Extra roll shall automatically drop in place when bottom roll is depleted. Unit shall be equipped with two theft-resistant, heavy-duty, one-piece, molded ABS non-controlled delivery spindles.

- 4) Manufacturer's service and parts manual shall be provided to the building owner / manager upon completion of the project.
- 5) Toilet Tissue Dispenser shall not protrude into accessible space no more than 3" from the face of the wall.
- 6) Acceptable manufacturers:
 - a) BOBRICK B-3888 -- 2-3/4" protrusion maximum.
- b. Non-accessible stalls: Controlled delivery, double roll, heavy-duty cast aluminum, satin finish, with high-impact plastic spindles with concealed locking device, theft-resistant, 12-1/2" wide, projects 4-7/8" from wall, surface mounted.
 - 1) Acceptable manufacturers:
 - a) BOBRICK B-274.
 - b) BRADLEY 5241.
7. Sanitary Napkins-Tampon Dispenser (Multiple Occupant Female):
 - a. Recessed dispenser of 22 gage stainless steel with satin finish:
 - 1) Acceptable manufacturers:
 - a) ASI 0468.
 - b) BOBRICK B-3706.
 - c) BRADLEY 407
 - d) McMURRAY 2250.
8. Sanitary Napkin Disposal:
 - a. Surface mounted stainless steel.
 - 1) Acceptable manufacturers:
 - a) BOBRICK B-270.
 - b) BRADLEY 4781-11.
9. Accessible Shower Seat:
 - a. Folding "L" Shaped seat, 32" x 19" nominal, 16 gage stainless steel seat, 18 gage tubing and 11 gage brackets, with brackets for positive "catch" in the "up" position, mounted opposite the shower controls.
 - 1) Acceptable manufacturers:
 - a) BOBRICK B5181.
10. Shelf with Mop Holder (All Custodian's rooms):
 - a. Stainless steel, 34" long - 3 holders and a shelf.
 - 1) Acceptable manufacturers:
 - a) BOBRICK B-239 x 34.
 - b) BRADLEY 9933.
11. Grab Bars:
 - a. 1-1/2" diameter, 18 gage seamless, stainless safety-grip finish, exposed mounting, vandal resistant screws, in configuration as required.
 - 1) Acceptable manufacturers:
 - a) BOBRICK B-6806-99.
 - b) BRADLEY 812-2.
12. Shower Curtain Rod:
 - a. Concealed mounting, 1" diameter, stainless steel.
 - 1) Acceptable manufacturers:
 - a) BOBRICK B-207.
 - b) BRADLEY 9538.
13. Mirrors (Type 1):
 - a. One piece channel frame, galvanized steel back, wall mounted for accessibility as detailed on the drawings, 1/4" tempered glass, size as shown.
 - 1) Acceptable manufacturers:

TOILET ACCESSORIES

2180

- a) BOBRICK B-165 Series.
- b) BRADLEY 781.

END OF SECTION

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SECTION 104400 – FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to furnish and install Fire Protection Specialties, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.

- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 04 22 00 CONCRETE MASONRY UNITS
 - 4. 05 12 00 STEEL AND FABRICATIONS
 - 5. 06 10 00 ROUGH CARPENTRY
 - 6. 09 22 16 METAL FRAMING
 - 7. 09 24 00 CEMENT PLASTER
 - 8. 09 29 00 GYPSUM BOARD
 - 9. 09 72 00 WALL COVERINGS
 - 10. 09 91 00 PAINTING
 - 11. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 12. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. Standards:
 - 1. In accordance with the following standards:
 - a. NAAMM National Association of Architectural Metal Manufacturers

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES.
 - 1. Product Data, indicating Project, location in Project for each Model Number for Fire Extinguishers, Fire Blankets, Cabinets, Doors and Trim

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three 3 projects of similar scope and size to that indicated for this Project.
 - 2. Manufacturer/Supplier Qualifications:

- a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:

- 1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. NFPA National Fire Protection Association (NFPA 10).

1.5 WARRANTY

A. Contractor's General Warranty:

- 1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

- 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- 2. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of portable fire extinguishers that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Failure of hydrostatic test according to NFPA 10.
 - 2) Faulty operation of valves or release levers.
 - a) Warranty Period: Six (6) years from date of Substantial Completion.

C. Installer's Warranty:

- 1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.

- 1. Specified product manufacturer, or approved equivalent:
 - a. LARSEN'S MANUFACTURING CO.
 - 1) Special hardware when required "Larsen-Loc".
 - 2) FEC-1:

- a) Non-rated Model #AL 2409-R3.
- b) Fire Extinguisher Model #MP5-A.
- 3) WB-1, General:
 - a) Bracket Model #821.
 - b) Fire Extinguisher Model #MP5-A.
- 4) WB-1 at Kitchens:
 - a) Bracket Model #1007.
 - b) Fire Extinguisher Model #WC-6L.
- 5) WB-1 at Pool Equipment Building:
 - a) Bracket Model #846.
 - b) Fire Extinguisher Model #MP10.
- b. Acceptable alternative manufacturer:
 - 1) JL INDUSTRIES
- 2. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MANUFACTURED UNITS

A. Cabinet and Extinguisher Types:

- 1. Semi-Recessed "Architectural Series" Type FEC-1.
 - a. Where wall depth is insufficient to accept complete box depth.
 - b. Non-rated: Model No. AL 2409-R3, for rough opening of 25"H x 10-1/2"W x 3"D. Box is to be fabricated from manufacturer's standard heavy gage steel, white baked enamel box. Provide at non-rated walls.
 - c. Fire-Rated: Model No. AL-FS-2409-R3, for rough opening of 26-1/3"H x 11-5/8"W x 3-3/4"D. Box is to be fabricated from manufacturer's standard double wall heavy gage steel, white baked enamel, fire rated box, with approved fire rated barrier material. Provide at one-hour or two-hour rated walls.
 - d. Provide 2-1/2 inch Rolled Edge Trim all around, fabricated from extruded aluminum with a clear satin anodized finish, with all corners mitered.
 - e. Typical Door (1/2" thick) to be "Vertical Duo" with tempered glass. Door to be fabricated from extruded aluminum with a clear satin anodized finish with "Black" Vertical Style Die Cut Lettering indicating "FIRE EXTINGUISHER" placed on the hinge side of the cabinet door.
 - f. Typical Door Hardware shall include a satin finish pull handle with a self-adjusting roller latch and a continuous piano hinge.
 - g. Provide Multi-Purpose Fire Extinguisher with a UL Rating of 3A-40B:C or 4A-80B:C at Science Classrooms and Vocational Shops.

B. Bracket and Extinguisher Type:

- 1. Surface mounted bracket Type WB-1.
 - a. General:
 - 1) Provide Multi-Purpose Fire Extinguisher with a UL Rating of 3A-40B:C.
 - 2) Model No. 821 extinguisher bracket, constructed of heavy gage steel with a white baked enamel finish.
 - b. Kitchen Locations:
 - 1) Provide Fire Extinguisher Model No. WC-6L (Wet Chemical) with a UL Rating of 2A:K.
 - 2) Provide extinguisher bracket Model No. 1007, constructed of heavy gage steel with a white baked enamel finish.

- c. Pool Equipment Building:
 - 1) Provide Multi-Purpose Fire Extinguisher with a UL Rating of 4A-80B:C.
 - 2) Model No. 846 extinguisher bracket, constructed of heavy gage steel with a white baked enamel finish.
- d. Provide backing in wall for attachment of bracket(s).

2.3 FABRICATION

- A. Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
 - 1. Weld joints and grind smooth.
 - 2. Prepare doors and frames to receive locks.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
 - 1. Fabricate door frames of one-piece construction, with edges flanged.
 - 2. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.5 STEEL FINISHES

- A. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond using manufacturer's standard methods.
- B. Baked-Enamel Finish: Immediately after cleaning and pre-treating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
 - 1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affect the execution of work under this specification section.

- a. Examine walls and partitions for suitable framing depth and blocking where recessed and semi-recessed cabinets will be installed.
 - b. Examine walls and partitions for suitable blocking where surface applied brackets will be installed.
 - c. Examine fire extinguishers for proper charging and tagging.
 - 1) Remove and replace damaged, defective, or undercharged units.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Coordination:
 1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
- B. Protection:
 1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
- C. Surface preparation:
 1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
 2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

- A. General:
 1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
 2. In accordance with approved submittals.
 3. In accordance with Regulatory Requirements.
 - a. Comply with all applicable ADA and CBC requirements in regards to accessible mounting heights.
 4. Set plumb, level, and square.
 5. Identification:
 - a. Apply decals, vinyl lettering, or other identification devices at locations indicated.
- B. Layout:
 1. Lines shall be straight and true.

3.4 ADJUSTING

- A. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.

1. Replace cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.5 CLEANING

- A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
 1. Clean any soiled surfaces immediately.
 2. In accordance with manufacturer's written instructions and recommendations.
 - a. Remove temporary protective coverings and strippable films, if any, as security fire-protection specialties are installed, unless otherwise indicated in manufacturer's written installation instructions.
 - b. Adjust cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
 - c. On completion of cabinet installation, clean interior and exterior surfaces as recommended in writing by manufacturer.
 - d. Touch up marred finishes, or replace cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended in writing or furnished by cabinet manufacturer.

3.6 PROTECTION

- A. Protection from traffic:
 1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 114000– FOOD SERVICE EQUIPMENT (ALTERNATE BID)

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material labor, equipment and services necessary to completely install all Food Service Equipment materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 06 41 23 MODULAR CASEWORK
 4. 07 60 00 SHEET METAL
 5. 09 22 16 METAL FRAMING
 6. 09 24 00 CEMENT PLASTER
 7. 09 29 00 GYPSUM BOARD
 8. 09 30 13 TILE
 9. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 10. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. Standards:
1. In accordance with the following standards:
 - a. AGA American Gas Association
 - b. AISI American Iron and Steel Institute
 - c. ASHRAE American Society of Heating, Refrigerating and Air-conditioning Engineers.
 - d. AWS American Welding Society
 - e. NSF National Sanitation Foundation may have occurred after the preparation of this specification section
 - f. UL Underwriters Laboratories

1.3 SYSTEM DESCRIPTION

- A. Performance Requirements: Provide all material, labor, equipment and services necessary to completely install all Food Service Equipment materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data.
 2. Shop Drawings.

- a. Submit shop drawings from manufacturer and fabricator detailing equipment assemblies and indicating dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.
3. Quality Assurance/Control Submittals:
 - a. Manufacturer's Written Instructions:
 - 1) Submit three (3) copies of manufacturer's written instructions.
 - b. Service Representative Certification:
 - 1) Submit three (3) copies of the Certification of the Service Representative for the Food Service Equipment within a 100 mile radius of the Project Site.
4. Closeout Submittals in accordance with Specification Sections in Division One:
 - a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - c. Project Documents in accordance with Specification Section - PROJECT DOCUMENTS.
 - d. Warranty in accordance with Specification Section -WARRANTIES, and of this section.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 1. Material Qualifications:
 - a. Equipment shall be designed in accordance with NSF and AGA and Bear the NSF Seal of Approval and be AGA certified.
 2. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 3. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
 - b. Manufacturers and models listed in the Schedule of Food Service Equipment are used to establish minimum standards for design, performance and construction intended.
 - 1) Fabricators or custom built equipment shall have qualified personnel, plant and equipment suitable to produce the specified items within the time requirement of the construction schedule.
- B. Regulatory Requirements:
 1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB)and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. CHD County Health Department (Local County in which the Project is located).
- C. Meetings:
 1. Pre- Installation: Scheduled by the Contractor prior to start of equipment installation.
 - a. Coordinate the work with all other related work.

- b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 1. Products shall be individually wrapped.
 2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
- B. Acceptance at Site:
 1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
 2. No equipment shall be delivered directly to the job site prior to having an installation crew on the premises, except with the written permission of the Architect or the Project Superintendent.
 3. Fabricated equipment shall be shipped in sections to facilitate entry into the building.
 4. Damaged products will not be accepted.
- C. Storage and protection:
 1. Products shall be stored in a dry, protected area.
 2. Products shall be stored in locked storage building.
 3. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 PROJECT CONDITIONS

- A. Existing Conditions:
 1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
 2. Field Measurements:
 - a. Take and be responsible for field measurements as required. Report any significant differences between field dimensions and Drawings to Architect prior to performing Work.
 3. All Work within space shall be complete.

1.8 WARRANTY

- A. In accordance with Specification Section - WARRANTIES.
- B. Equipment Warranties:
 - 1. Manufacturer's to provide standard equipment warranties on all equipment if it exceeds the State of California Standard One Year Construction Warranties.
- C. Service Warranty:
 - 1. Warranty period One (1) Year from the Date of Substantial Completion.
 - 2. Installers shall maintain an area Service Representative for the duration of the Service Warranty Period.

1.9 OWNER'S INSTRUCTIONS

- A. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train the Owner's maintenance personnel as specified below:
 - 1. Test and adjust controls and any safeties. Replace damaged or malfunctioning controls and equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified product manufacturer:
 - a. ADVANCE TABCO.
 - b. BUSBOY BY KENLIN, INC.
 - c. DUKE MANUFACTURING CO.
 - d. GROEN.
 - e. HOBART.
 - f. KOLPAK MANUFACTURING CO.
 - g. METRO.
 - h. THE MONTAGUE COMPANY.
 - i. PITCO FRIALATOR, INC.
 - j. SCOTSMAN.
 - k. SERVOLIFT EASTERN CORPORATION.
 - l. SUB-ZERO.
 - m. TRAULSEN & CO., INC.
 - n. WELLS MANFUACTRING COMPANY.
 - o. WOLF RANGE COMPANY.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Materials for Fabricated Food Service Equipment:

1. General Requirements:
 - a. Manufactured Food Service Equipment to be incorporated as an integral part of Fabricated Food Service Equipment where indicated.
 - b. Provide opening as required for all faucets and provide all faucets as specified.
 - c. Provide all sink-drains complete with 6 inch tailpiece.
 - d. All work straight and uniform, of proper strength and accurately fitted together.
 - e. Level and smooth all plain work.
 - f. All joints to be welded, ground smooth, buffed to No. 4 finish and in accordance with AWS.
 - g. Fabricate to field dimensions. Significant discrepancies with Drawings shall be reported to Architect prior to installation.
 - h. Slope sink bottoms 1/2 inch to drain for positive drainage.
 - i. All exposed edges of metal shall be ground round and smooth.
 - j. Sinks, disposer cones and similar to items shall be shop welded integral with top.
2. Materials:
 - a. Stainless Steel in accordance with AISI 18-8, Type 302 with No. 4 finish on all exposed surfaces.
3. Construction:
 - a. Counter Tops and Sinks: 14 gage stainless steel unless otherwise noted.
 - b. Shelves: 16 gage stainless steel unless otherwise noted.
 - 1) Under shelves shall be galvanized iron.
 - c. Legs:
 - 1) 1-5/8 inch outside diameter, 16 gage galvanized iron tuning with galvanized iron leg sockets and concealed thread galvanized iron bullet feet.
 - 2) Drill bottom of feet to receive floor anchor.
 - d. Supports and Stiffeners: 14 gage stainless steel metal channels.
 - e. Spacer: 2 inch wide, 10gage stainless steel Z.
 - f. Fasteners Non-corrosive and tamper proof.

2.3 MANUFACTURED UNITS

A. General:

1. All plumbing is an integral part of manufactured Food Service Equipment shall be complete and operable.
2. All plumbing supply connections shall be complete with female fittings.
3. All drains shall be complete with 6 inch tail piece.
4. All equipment shall have NSF seal of approval.
5. Furnish all accessories and components listed in manufacturer's literature as standard with food service equipment specified by model or catalog number.
6. Furnish additional accessories or modifications to equipment as specified in the Fabricated Food Service Equipment Schedule at the end of this section.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:

1. Coordinate work under this specification section with work specified under other specification sections to ensure proper and adequate interface of work specified under this specification section.

3.3 INSTALLATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved shop drawings.
3. In accordance with Regulatory Requirements and NSF.
4. Set plumb, level and square.
5. Accurately set all equipment.
6. Integrate different items as required for proper interface of equipment.

B. Layout:

1. Lines shall be straight and true.

3.4 ADJUSTING

A. Adjusting:

1. Test and adjust controls and safeties.
2. Replace damaged or malfunctioning controls and equipment.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.

1. Clean any soiled surfaces at the end of each day, minimum.
2. Finish shall be clean and ready for the application of any additional finishes.
3. In accordance with manufacturer's written instructions and recommendations.

3.6 DEMONSTRATION

A. In accordance with Specification Section - PROJECT CLOSEOUT.

1. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train Owner's maintenance personnel as specified below.
 - a. Schedule training with the Owner's maintenance personnel with at least seven (7) days advance notice.

- b. Train Owner's maintenance personnel on procedures and schedules related to start-up and shut-down, troubleshooting, servicing, and preventative maintenance.)
- c. Review data in "Operating and Maintenance Manuals." Refer to Specification Section – PROJECT CLOSEOUT.

3.7 SCHEDULES

A. Fabricated Food Service Equipment Schedule:

1. **WORK COUNTER & SINK**

- a. Size:
 - 1) As shown on the drawings and in accordance with General Requirements.
 - 2) Provide bottom shelf.
- b. Sinks:
 - 1) One (1) 20" x 28" x 14" deep sinks with 2" diameter lever waste drawing outlets with chrome plated tail piece.
- c. Trim:
 - 1) Trim: Coordinate installation of one (1) Faucet, one swing spout (refer to mechanical), and Leer Waste Drain Outlets for one (1) sink.

B. Manufactured Food Service Equipment Schedule:

1. **WALL SHELF**

- a. Model No. WS-12-72-16 with brackets
- b. Manufacturer: ADVANCE TABCO
- c. Size: 72" long x 12" wide
- d. Materials and Finish: Shelf and Brackets (three) are die stamped and die formed 16 gage, Type 304 Stainless Steel, with a #4 Finish.

END OF SECTION

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SECTION 13 11 00 - SWIMMING POOL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The scope of the work included under this Section of the Specifications shall include swimming pool(s) as illustrated on the Drawings and specified herein. The General and Supplementary Conditions of the Specifications shall form a part and be included under this Section of the Specifications. The Swimming Pool Subcontractor shall provide all supervision, labor, material, equipment, machinery, plant and any and all other items necessary to complete the work. ALL OF THE WORK IN SECTIONS 13 11 00 - 13 11 10 IS TO BE THE RESPONSIBILITY OF ONE EXPERIENCED SWIMMING POOL SUBCONTRACTOR PRIMARILY ENGAGED IN THE CONSTRUCTION OF COMMERCIAL PUBLIC-USE SWIMMING POOLS. A SWIMMING POOL SUBCONTRACTOR SHALL BE CONSIDERED PRIMARILY ENGAGED AS REQUIRED HEREIN IF THE SUBCONTRACTOR DERIVED 50% OF ITS ANNUAL REVENUE FROM PUBLIC-USE SWIMMING POOL CONSTRUCTION FOR EACH OF THE LAST FIVE YEARS. THE SUBCONTRACTOR MUST HAVE ALSO, IN THE LAST FIVE YEARS CONSTRUCTED AT LEAST FIVE (5) COMMERCIALY DESIGNED MUNICIPAL AND PUBLIC-USE SWIMMING POOLS, EACH OF WHICH SHALL HAVE INCORPORATED A MINIMUM SIZE OF 6,000 SQUARE FEET OF WATER SURFACE AREA WITH A CONCRETE AND CERAMIC TILE PERIMETER OVERFLOW GUTTER AND SELF-MODULATING BALANCE TANK. The Swimming Pool Subcontractor shall furnish and install the swimming pool structures, finishes, cantilever forming, swimming pool mechanical and electrical systems, and all accessories necessary for a complete, functional swimming pool system, as herein described. Work shall include start-up, instruction of Owner's personnel, as-built drawings and warranties as required.

1.2 CODES, RULES, PERMITS, FEES

- A. The swimming pools shall be constructed in strict accordance with the applicable provisions set forth by authorities having jurisdiction over swimming pool construction and operation in the State of California.
- B. The Swimming Pool Subcontractor shall give all necessary notices, obtain all permits, and pay all government sales taxes, fees, and other costs in connection with his work; file all necessary plans, prepare all documents and obtain all necessary approvals of governmental departments having jurisdiction; obtain all required certificates of inspection for his work and deliver same to the Designated Representative before request for acceptance and final payment for the work.
- C. The Swimming Pool Subcontractor shall include in the work any labor, materials, services, apparatus, or drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on Drawings and/or specified.
- D. The Contractor shall submit all required documents and materials to all Governmental Departments having jurisdiction for any deferred approval items or substituted materials or products to obtain final approval to installation.

1.3 DESCRIPTION OF WORK

- A. Furnish and perform supervision, coordination, all layout, formwork, excavation, hand trim, disposing off-site of all unused material or debris to complete the swimming pool excavation to the dimensions shown on the plans.
- B. Furnish and install complete swimming pool structures, including reinforcing steel and cast-in-place or pneumatically placed concrete walls and floors.
- C. Furnish and install swimming pool finishes, including ceramic tile and marble plaster or other waterproof finishes.
- D. Furnish and install complete swimming pool mechanical system(s), including, but not limited to, circulation systems, filtration systems, pool water heating systems, water chemistry control systems, domestic water fill line systems, booster pump and special effects systems, and all pumps, piping, valves, and connections between system(s) and swimming pool(s).
- E. Furnish and install complete swimming pool electrical system(s) from P.O.C. in Mechanical Room, including, but not limited to, underwater lighting systems, water level control systems, timing systems, scoreboards, special effects systems, control circuitry, motor starters, time clocks, bonding, and all conduits, conductors, contactors, and switches between the system(s) and swimming pool(s).
- F. Furnish and install all swimming pool cantilever forming, deck equipment and required anchors and inserts for the specified equipment as required by code, shown on the Drawings and specified herein.
- G. After the initial filling of the swimming pool system(s), should any repairs, continuing work, or other Subcontractor responsibility require drainage or partial drainage of the swimming pool systems, the Swimming Pool Subcontractor shall be responsible for any subsequent refilling and shall complete the project with the swimming pool system(s) full of water, water in chemical balance, complete in every way, and in full operation.

1.4 ASSIGNED RESPONSIBILITIES AND RELATED WORK

- A. It is the intent of this section of the Specifications to clarify Work responsibilities of the trades directly and indirectly involved in construction of the pool systems. All labor, equipment, materials and supplies furnished by the Swimming Pool Subcontractor and other Subcontractors shall be as directed by the Owner through his Designated Representative.
- B. **THE SWIMMING POOL SUBCONTRACTOR SHALL NOT SUBCONTRACT ANY PORTION OF THE SWIMMING POOL CONSTRUCTION OR SWIMMING POOL EQUIPMENT INSTALLATION TO ANYONE OTHER THAN A SUBCONTRACTOR THAT SATISFIES THE REQUIREMENTS OF SECTION 13 11 00.**
- C. References to “swimming pool systems” shall include the swimming pools, equipment, and accessories.
- D. The Owner will provide one complete water filling of the swimming pool(s) but will not assume any responsibility for the swimming pool system(s) until they have been proved fully operational, complete in every way and accepted by the Designated Representative.

1.5 RESPONSIBILITIES OF THE CONTRACTOR

- A. The Contractor shall grade the swimming pool site(s), establish benchmarks, cut and fill as necessary to provide as level an area as possible at swimming pool deck elevation before swimming pool layout.
- B. The Contractor shall be responsible for horizontal dimensions and grade elevations accurately from established lines and benchmarks (as indicated on the Drawings) and be responsible for those grades.
- C. The Contractor shall provide adequate temporary light, electric power, heat and ventilation per Federal and State OSHA requirements to construct the swimming pool system(s).
- D. The Contractor shall not permit any heavy equipment activity over any area or within five (5) feet of any area under which swimming pool piping is buried. There shall be no exceptions to this requirement.
- E. The Contractor shall keep the swimming pool excavation(s) and swimming pool structure(s) free of construction residue and waste materials of his workmen or Subcontractors, removing said material from the swimming pools as required.
- F. The Contractor shall protect the swimming pool(s) from damage caused by his construction equipment and /or workmen and Subcontractors.
- G. The Contractor shall provide a representative at time of swimming pool start-up to coordinate all trades related to swimming pool system(s).

1.6 RESPONSIBILITIES OF THE MECHANICAL SUBCONTRACTOR

- A. The Mechanical Subcontractor shall be licensed in the State of California and provide written notifications to Swimming Pool Subcontractor and contractor when necessary to excavate and backfill within the swimming pool construction site.
- B. The Mechanical Subcontractor shall not utilize any swimming pool piping trench for installation of any sanitary sewer, storm sewer, domestic water, hot water, chilled water or natural gas line.
- C. The Mechanical Subcontractor shall furnish and install all sanitary sewer piping, including vent stacks (if necessary), for backwash pits, floor drains and floor sinks as required by code, shown on Drawings, and herein specified.
- D. The Mechanical Subcontractor shall furnish and install all storm sewer piping and site drainage systems as required by code, shown on the Drawings, and herein specified.
- E. The Mechanical Subcontractor shall provide a minimum 75 psi water supply for swimming pool construction work within fifty (50) feet of the swimming pool construction site(s).
- F. The Mechanical Subcontractor shall furnish and install reduced pressure backflow protected domestic water lines to P.O.C. within swimming pool Mechanical Room as required by code, shown on the Drawings, and herein specified.

- G. The Mechanical Subcontractor shall furnish and install natural gas piping, pressure regulation and valving to P.O.C. within swimming pool Mechanical Room as required by code, shown on the drawings, and herein specified.
- H. The Mechanical Subcontractor shall furnish and install all ductwork, louvers, and all HVAC equipment within swimming pool Mechanical Room as required by code, shown on the Drawings, and herein specified.
- I. The Mechanical Subcontractor shall provide a representative at time of swimming pool start-up to coordinate work related to swimming pool system(s).

1.7 RESPONSIBILITIES OF THE ELECTRICAL SUBCONTRACTOR

- A. The Electrical Subcontractor shall be licensed in the State of California and shall furnish and install electrical service to swimming pool Mechanical Room sized to accommodate all necessary swimming pool equipment as shown on the Drawings and herein specified.
- B. The Electrical Subcontractor shall furnish any temporary power needed by the Swimming Pool Subcontractor within fifty (50) feet of the swimming pool construction site(s).
- C. The Electrical Subcontractor shall furnish and install all conduits, conductors, starters/disconnects, panels, circuits, switches and equipment as required for lighting, ventilation and HVAC equipment within swimming pool Mechanical Room as required by code, shown on the Drawings, and herein specified.
- D. The Electrical Subcontractor shall furnish and install all conduits, conductors, panels, circuits, switches and equipment for area lighting as required by code, shown on the Drawings, and herein specified.
- E. All equipment, material and installation shall be as required under Division 16 of the Specifications and shall conform to NEC Article 680 (latest revision), State and Local Codes, and as may be required by all authorities having jurisdiction over swimming pool construction within the State of California.
- F. The Electrical Subcontractor shall provide a representative at time of swimming pool start-up to coordinate work related to swimming pool system(s).

1.8 INTENT

- A. It is the intention of these specifications and Drawings to call for finished work, tested and ready for operation. Wherever the work “provide” is used, it shall mean “furnish and install complete and ready for use.”
- B. Minor details not usually shown or specified, but necessary for proper installation and operation, shall be included in the work, the same as if herein specified or shown.

1.9 SCHEDULE OF VALUES

- A. Provide a Schedule of Values for all work specified in each of the technical specifications listed

in the table below, regardless of whether the work is performed by the swimming pool contractor or others. Values listed shall be fully burdened, with contractor general conditions, overhead, profit and bonds included. Payments for swimming pool work completed shall not be approved until Schedule of Values has been submitted to and approved by Architect.

SWIMMING POOL SCHEDULE OF VALUES			
No.	Section #	Description	Value
1.	13 11 01	Swimming Pool Excavation	
2.	13 11 02	Swimming Pool Concrete	
3.	13 11 03	Swimming Pool Shotcrete	
4.	13 11 04	Swimming Pool Ceramic Tile	
5.	13 11 06	Swimming Pool Equipment	
6.	13 11 07	Swimming Pool Mechanical	
7.	13 11 08	Swimming Pool Electrical	
8.	13 11 09	Pre-Fabricated Swimming Pool	
9.	13 11 10	Swimming Pool Waterproofing	
Total			

1.10 SUBMITTAL PROCEDURES

- A. General: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Architect for Subcontractor's use in preparing submittals.
- B. Coordination: Coordinate preparation and processing submittals with performance construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity. 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 Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for schedules performance of related construction activities.
- D. Processing Time: Allow enough time for submittal review, including time for re-submittals as follows. Time for review shall commence on Architect's receipt of submittal.
 - 1. Initial Review: Allow fifteen (15) days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect will advise Contract when a submittal being processed must be delayed for coordination.
 - 2. Concurrent Review: Where concurrent review of submittals by Architect's consultants, Owner, or other parties is required, allow twenty-one (21) days for initial review of each submittal.
 - 3. Direct Transmittal to Consultant: Where the Contract Documents indicate that submittals

may be transmitted directly to Architect's consultants, provide duplicate copy of transmittal to Architect. Submittal will be returned to Architect before being returned to Subcontractor.

4. If intermediate submittal is necessary, process it in same manner as initial submittal.
 5. Allow fifteen (15) days for processing each submittal.
 6. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
- E. Identification: Place a title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on title block.
 2. Provide a space on title block to record Subcontractor's review and approval markings and action take by Architect.
 3. Include the following information on title block for processing and recording action taken: (See Attached Sample)
 - a. Project name.
 - b. Date.
 - c. Name and address of Subcontractor.
 - d. Name of Subcontractor.
 - e. Name of Supplier.
 - f. Name of Manufacturer.
 - g. Unique identifier, including revision number.
 - h. Number and title of appropriate Specification Section.
 - i. Drawing number and detail references, as appropriate.
 - j. Other necessary identification.

SUBMITTAL FOR:	SUBMITTAL TO:	SUBCONTRACTOR:
----------------	---------------	----------------

Item Number:	_____
Section Number:	_____
Section Description:	_____
Subcontractor:	_____
Supplier:	_____
Manufacturer:	_____
Product Code:	_____
Quantity:	_____

<p>Subcontractor Certification:</p> <p>It is hereby certified that the equipment or material designated in this submittal is proposed to be incorporated in the above named project and is in compliance with the contract drawings and / or specifications and is submitted for approval.</p> <p>Certified by: _____</p> <p>Date: _____</p> <p>Job _____</p> <p>Superintendent: _____</p> <p>Revisions: _____</p>	<p>Contractor's Submittal Stamp:</p>
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Architect's Review Stamp and Comments

- F. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract documents on submittal.
- G. On all catalogue or cut sheets identify which model or type is being submitted.
- H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Product data and shop drawings shall be packaged within a three-ring binder and colored samples shall be packaged on a heavy cardboard. Transmit each submittal using a transmittal form.
 - 1. On an attached separate sheet, prepared on Subcontractor's letterhead, record relevant information, request 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. Include the same label information as the related submittal.
 - 2. Include Subcontractor's certification stating that information submitted complies with requires of the Contract Documents.
 - 3. Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of Subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Remarks.
- I. 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.
- J. Use for Construction: Use only final submittals with mark indicating action taken by Architect in connection with construction.

1.11 SUBSTITUTIONS

- A. To obtain approval to use unspecified products, bidders shall submit requests for substitution at least ten (10) days prior to bid date. Requests shall only be considered if they clearly describe the product for which approval is asked, including all data necessary to demonstrate acceptability. All unspecified products and equipment will be considered on an "or equal" basis at the discretion of the Designated Representative. Requests for substitution received after the specified deadline will not be considered. Where a conflict exists between the requirements of the General Conditions / Special Conditions / Division 1 concerning substitutions and the requirements of this Article, this Article (Section 13 11 00, Article 1.10) shall govern.
- B. Where the Swimming Pool Subcontractor proposes to use an item of equipment other than that specified or detailed on the Drawings which requires any redesign of the structure, partitions, foundations, piping, wiring, or any other part of the architectural, mechanical, or electrical layout, all such redesign and all new drawings (stamped by California Licensed Engineer) and

detailing required shall be prepared by the Swimming Pool Subcontractor, at his own expense, submitted for review and approval by the Designated Representative prior to bid.

- C. Where such approved deviation requires a different quantity and arrangement of piping, supports and anchors, wiring, conduit, and equipment from that specified or indicated on the Drawings, the Swimming Pool Subcontractor shall furnish and install any such piping, structural supports, controllers, motors, starters, electrical wiring and conduit, and any other additional equipment required by the system, at no additional cost to the Owner.

1.12 SURVEYS AND MEASUREMENTS

- A. The Swimming Pool Subcontractor shall base all measurements, both horizontal and vertical, from benchmarks established by the Contractor. All work shall agree with these established lines and levels. The mechanical Drawings do not give exact details as to elevations of piping, exact locations, etc. and do not show all offsets, control lines, pilot lines and other installation details. Verify all measurements at site and check the correctness of same as related to the work.

1.13 DRAWINGS

- A. Drawings are diagrammatic and indicate the general arrangement of the systems and work included in the Subcontractor. Drawings are not to be scaled. The architectural drawings and details shall be examined for exact dimensions. Where they are not definitely shown, this information shall be obtained from the Designated Representative.

1.14 SWIMMING POOL SUBSUBCONTRACTOR

- A. The swimming pool construction work as herein described and specified in Division 13 of the Project Manual shall be the complete responsibility of a qualified and specifically licensed (C-53 license classification within the State of California) Swimming Pool Subcontractor with extensive experience in commercial public use swimming pool installations.
- B. The Contractor shall require the Swimming Pool Subcontractor to furnish to the Contractor performance and payment bonds in the amount of 100% of the Swimming Pool Subcontractor's bid written by a surety Company properly registered in the State of California and listed by the U.S. Treasury. The expense of the bond(s) is to be borne by the Subcontractor. The Contractor shall clearly specify the amount and requirements of the bond(s) in the Contractor's written or published request for subbids. The Contractor's written or published request for subbids shall also specify that the bond(s) expense is to be borne by the Subcontractor.
- C. Subcontractor certifies that it meets the qualifications and experience requirements established in Swimming Pool General Requirements, Section 13 11 00, as follows:
 1. Subcontractor has derived 50% of its annual revenue from public-use swimming pool construction for each of the last five (5) years.
 2. Subcontractor has, in the last five (5) years, constructed at least five (5) commercially designed municipal and public-use swimming pools, each of which have incorporated a minimum size of 6,000 square feet of water surface area with a concrete and ceramic tile perimeter overflow gutter and self-modulating balance tank.

3. The following list of projects meet the requirements of section (b) above and the contact as reference by the Contractor, the Awarding Authority of their agent or designee.

a. Owner: _____
Scope of Project: _____
Contact Person: _____
Phone Number: _____
Architect for Project: _____

b. Owner: _____
Scope of Project: _____
Contact Person: _____
Phone Number: _____
Architect for Project: _____

c. Owner: _____
Scope of Project: _____
Contact Person: _____
Phone Number: _____
Architect for Project: _____

d. Owner: _____
Scope of Project: _____
Contact Person: _____
Phone Number: _____
Architect for Project: _____

e. Owner: _____
Scope of Project: _____
Contact Person: _____
Phone Number: _____
Architect for Project: _____

D. Swimming Pool Deck Subcontractor other than the swimming pool Subcontractor certifies that it meets the qualifications and experience requirements established in Swimming Pool General Requirements, Section 13 11 00, as follows:

1. Subcontract has, in the last five (5) years, constructed at least five (5) commercially designed cantilevered pool decks over perimeter gutters, each of which have incorporated a minimum size of 6,000 square feet of water surface area of the swimming pool.
2. The following list of projects meet the requirements of section (b) above and the contact as reference by the Contractor, the Awarding Authority of their agent or designee.

SWIMMING POOL DECK SUBCONTRACTOR

a. Owner: _____
Scope of Project: _____
Contact Person: _____
Phone Number: _____
Architect for Project: _____

- b. Owner: _____
 Scope of Project: _____
 Contact Person: _____
 Phone Number: _____
 Architect for Project: _____

- c. Owner: _____
 Scope of Project: _____
 Contact Person: _____
 Phone Number: _____
 Architect for Project: _____

- d. Owner: _____
 Scope of Project: _____
 Contact Person: _____
 Phone Number: _____
 Architect for Project: _____

- e. Owner: _____
 Scope of Project: _____
 Contact Person: _____
 Phone Number: _____
 Architect for Project: _____

1.15 OPERATING INSTRUCTIONS

- A. The Swimming Pool Subcontractor shall determine from actual samples of pool water supplied by the Owner, the proper water management program necessary for maximum operating efficiency and comfort. The Swimming Pool Subcontractor shall provide the services of experienced personnel familiar with this type of pool system operation, in conformance with Section 13 11 05 of the Specifications.

1.16 MAINTENANCE MANUALS

- A. The Swimming Pool Subcontractor shall provide six (6) bound sets for delivery to the Designated Representative of instructions for operating and maintaining all systems and equipment included in this Contract. Manufacturer’s advertising literature or catalog pictures will not be acceptable for operating and maintenance instructions.
- B. Bound in ring binders shall be all parts lists, periodic maintenance instructions and troubleshooting guidelines for all pool equipment, including but not limited to filters, pumps, controllers, water chemistry control equipment, etc.

1.17 SECURE FROM THE OWNER

- A. A complete Owner-furnished filling of the swimming pools.

- B. The Owner's assistance, as specified herein, from the time of start-up until final written acceptance of the swimming pool system(s).
- C. Chemicals as required for swimming pool operation after Swimming Pool Subcontractor completes initial water chemistry balance and water treatment during the maintenance period described in Section 13 11 05 of the Specifications.

1.18 WARRANTY

- A. The Swimming Pool Subcontractor shall warrant all swimming pool structures, finishes and systems against defects in material and workmanship for a period of one year after the date of acceptance by the Owner. Any repair or replacement required due to defective material or workmanship will be promptly corrected by the Swimming Pool Subcontractor.

PART 2 - PRODUCTS
NOT USED

PART 3 - EXECUTION
NOT USED

END OF SECTION

SECTION 13 11 01 - SWIMMING POOL EXCAVATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Finish and fine grading to bring the surface of the ground to the required grades and elevations as indicated on the Drawings.
- B. Subgrade improvements and placing of compacted fills.
- C. Excavation and backfill for all swimming pool, pool deck, and structural requirements, including footings, foundations, slabs and walls.

1.2 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies: Conform with requirements of the General Conditions, and more specifically the following:
 - 1. Comply with California Building Code, latest edition.
 - 2. Comply with applicable construction safety orders, latest edition, Federal and State OSHA.
 - 3. Comply with applicable trench safety provisions, latest edition, Federal and State OSHA.
- B. Qualifications of Workers:
 - 1. The entity performing the work of this Section shall have been successfully engaged in the respective trade for at least five (5) years immediately prior to commencement of the Work.
 - 2. For actual construction operations, use only trained and experienced workers with a minimum of three (3) years experience with the materials and methods specified.
 - 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with a minimum of five (5) years experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.
- C. Project/Site Conditions:
 - 1. Be familiar with site and subsurface conditions.
 - 2. Excavation is unclassified and includes excavation to sub-grade elevations indicated or necessary, regardless of character of materials and obstructions encountered.
 - 3. Provisions for mitigation of wet soils due to seepage or rain shall be made during excavation and throughout construction. If wet soils are encountered within the swimming pool excavations, de-watering shall be provided and the Geotechnical Engineer shall make recommendations for moist soil mitigation.
 - 4. Where slope instability is encountered, all excavations within those areas shall be 1:1 or flatter. Forming of vertical walls may be necessary, and all soil conditions shall be field verified by the Geotechnical Engineer.
 - 5. Contractor shall review the Geotechnical Investigation Report as furnished by the Owner's Representative to determine the suitability of the soils.

- D. Adverse Weather Conditions:
1. During the periods when site soil moisture content is substantially in excess of moisture content required for optimum compaction, do not perform fill compaction.
 2. When unfavorable weather conditions necessitate interrupting filling and grading operations, prepare areas by compaction of surface and grading to avoid collection of water. Provide adequate temporary drainage to prevent erosion.

1.3 SUBMITTALS AND SUBSTITUTIONS

- A. Provide submittals in conformance with requirements of Section 01 33 00. Requests for substitution shall conform to requirements of Article 1.10.A of Section 13 11 00.
- B. Required submittals include:
1. Offsite fill material, if applicable.
- C. Submit proof of qualifications as specified in Article 1.2.A of this Section.

1.4 EXCAVATING & TRENCHING, GENERAL REQUIREMENTS

- A. Refer to Section 01 50 00, Temporary Facilities and Controls.
- B. All trenches, holes, etc. are to be completely protected using solid barricades, steel plates, and plywood both during construction and during off hours, including night time.
- C. Flashing warning light barricades are required on sidewalks, roads, and any other critical areas that require night time protection.
- D. Roads, paths and sidewalks shall not be blocked at any time or in any way. Trenching across roads, paths or sidewalks involves special instructions and review of the construction procedure by the Owner's Representative at least three (3) days prior to the Work actually being started.
- E. Construction equipment, including all trucks, cars, etc. shall not be parked or driven on roads, paths or sidewalks. Items not allowed on roads, paths or sidewalks include hoses, power cords, ropes, construction materials, dirt and debris, etc.
- F. All roads, paths and sidewalks must remain clear and the Contractor shall maintain temporary safe and effective pedestrian access at all times.
- G. Drawings show existing major underground utilities using the best information available. The Contractor shall also fully check public works reference drawings prior to excavation. Call local Dig Alert to locate utilities to ensure safety.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Fill Material, General: All material shall be subject to the review of the Geotechnical Engineer to determine acceptability.

- B. All engineered fill soils shall be nearly free of organic and other deleterious debris and less than 3 inches in maximum dimension. The on-site soil exclusive of debris may be used as engineered fill, provided it contains less than 3 percent organics by weight (ASTM D2874).

Recommended requirements for any imported soils to be used as engineered fill, as well as applicable test procedures to verify material suitability, are provided on Table 6.3-1 of the Geotechnical Report.

- C. Soils used as engineered fill shall be uniformly moisture conditioned to at least the percentages above optimum moisture indicated in Table 6.3-2 of the Geotechnical Report and placed in horizontal lifts less than 8 inches in loose thickness, and compacted to with the in the required range of relative compaction indicated in Table 6.3-2 of the Geotechnical Report. Discing and/or blending may be required to uniformly moisture-condition soils used for engineered fill. The actual level of moisture conditioning and compaction will be based on the expansion potential and moisture density relationships determined during grading. The general intent is to bring the expansive material to about 80 to 85 percent saturation at the time of construction. Preliminary design with use of on-site soil should consider criteria for the EI range of 21-50 (PI 16-25).

- D. Gravel Back Fill at Pool Structure

1. All backfill in contact with or within the clear zone of the Myrtha structure, as defined by the area pool side of a vertical plane at the furthest structural support, will consist of material, be placed and compacted per the manufacture's specifications. This associated material shall be what is commonly referred to as a self-compacting pea gravel with the following basic characteristics.

- a. Well drained
- b. Cohesionless material
- c. Average grain size of less than 1"
- d. Consistently even distribution
- e. Self-compacting in nature
- f. Clean and washed
- g. Smooth non-angular surface

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify drawing dimensions and elevations with actual field conditions. Inspect related Work and adjacent surfaces and report discrepancies and conditions which prevent proper execution of the Work to the Owner's Representative.

3.2 SUBGRADE IMPROVEMENTS

- A. Clearing: Strip site area (as defined within the Drawings) of any topsoil containing vegetation, trees and roots, organic matter, and other debris, and dispose of as specified.
- B. All areas to receive fill or to support structures, or concrete flatwork shall be scarified at least 8 inches below exposed subgrade elevation. The subgrade soil shall be uniformly moisture conditioned, proof rolled to detent soft or pliant areas, and compacted to the requirements for

engineered fill, as indicated in Table 6.3-2 of the Geotechnical Report. Soft or pliant areas shall be mitigated in accordance with 6.2.2 of the Geotechnical Report.

3.3 EXCAVATION

- A. **Checking Layout:** Contractor shall, before commencing the excavation work, check all lines, stakes and levels for dimensions, angles, elevations and grades with the survey.
- B. **Dimensions:** Excavate to proper dimensions as shown, cut square and smooth with firm level bottoms. Prepared excavations shall be approved by Geotechnical Engineer. Excavations shall be free of loose or disturbed materials.
- C. **Excess Water Control:** Keep all excavations free from standing water by pumping, draining or providing proper protection against water intrusion. If soil becomes soft, soggy or saturated, perform additional excavation to firm soil not affected by water.
- D. **Form Removal:** Make all excavations of sufficient size to permit installation and removal of forms and all other required work.
- E. **Alternate Forming:** Sides of structures may be formed by neat excavations where banks will stand without caving. If banks cave, provide forming as required and widen excavation to permit forming, bracing and inspection. Provide forming in conformance with Section 13 11 02 and all recognized safety standards. Form all grade beams.
- F. **The Contractor shall be aware that slope, height, slope inclination, or excavation depths (including utility trench excavations) should in no case exceed those specified in local, State, and/or Federal Safety Regulations (e.g. OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations.) All excavations shall be constructed and maintained in conformance with current OSHA requirements (29 CFR Part 1926) for a Type C (Sandy Silt) soil.**

3.4 BACKFILLING

- A. **Method:** After concrete has been placed, forms removed and concrete work approved, backfill the excavations with earth to indicated or required grades. Carry on backfilling simultaneously on each side of walls or grade beams. Remove all rubbish and wood from the excavations before placing backfill.
- B. **Concrete Protection:** Prior to placing any backfill, adequately cure all concrete and provide any bracing required to ensure the stability of the structure. Protect waterproofing and dampproofing against damage in a manner acceptable to the Owner's Representative. Remove bracing as backfill operations progress.
- C. **Material:** Use the material from the excavations for backfilling, subject to approval by Soils Testing Agency. The earth shall be free from debris, large clods or stones.
- D. **Lifts:** Place backfill in 8" inch loose layers, bring to optimum moisture content and compact to within the required range of relative compaction indicated in Table 6.3-2 of the Geotechnical Report, sloping down and away from the structures being backfilled.

- E. Moisture: Rigidly control the amount of water used to ensure optimum moisture conditions for the type of fill material used. Excessive amounts of water causing saturation of earth will not be permitted. Compaction by flooding or jetting is prohibited.
- F. Placing Gravel Back Fill at Pool Structure
 1. The material shall be placed in one foot lifts around the perimeter of the structure in such a manner that the grains naturally compact.
 2. No heavy vibratory or mechanical compaction shall occur within the aforementioned "clear zone".
 3. Walk behind skid compactors or similar apparatus are permissible. Special attention should be taken to ensure the backfill does not sluff away from the panel at horizontal protrusions such as gutters, skimmer boxes, buttresses, etc.
 4. Refer to Aquatics structural engineering drawings and specifications; as well as all geotechnical recommendations for other backfill and compaction procedures and requirements for the project.
 5. Any conflicts between this specialized requirement and the general earthwork specifications and drawings will be brought to the attention of the engineer of record during the bidding process.
 6. No perceived conflicts will be considered justification to a change to the base contract unless specifically expressed during the bidding process.
 7. The installing contractor is responsible for any damage or misalignment of the panels or structure resulting from the improper installation of these specific backfill requirements

3.5 GRADING

- A. Slopes: Grade to finish grades indicated on Drawings, with uniform slopes between all points.
- B. Subgrades: Blade to required grade and roll or tamp subgrades for exterior slabs, decks and paving.

3.6 TRENCHING FOR PIPING OR CONDUIT

- A. Cut trenches true and straight. Make sides with neat cut. Bottom of trenches shall be uniform in conformance with laying piping
- B. Cut trenches wide enough to provide sufficient working space.
- C. Compact bottom of trench to 92% relative compaction.
- D. Piping or conduit to bear on firm soils and fill. Notify the Architect if unsuitable bearing is encountered at depths indicated on the drawings.
 1. Sub-base support: Where installation of sub-base material is indicated, excavate to depth indicated or, if not otherwise indicated, a minimum of six (6) inches below bottom of work to be supported.
 2. Excavate by hand below belling so that piping bears continuously on firm soil.
- E. Fill trenches excavated below required depths to required depths with Sand Fill, Earth Fill, or Back Fill as required in accordance with article titled "Placing Back Fill" within Section 03 30 00, 2.4A(h).
 1. Lean concrete shall be used as backfill where utility trenches extending from the exterior

to the interior limits of building. Lean concrete shall extend a minimum distance of two (2) feet laterally on each side of the exterior building line and a minimum of six (6) inches above footing penetration.

3.7 SLABS ON GRADE

- A. Slabs on grade shall be supported on recompacted soils or engineered fill placed as described in Section 6.3 of the Geotechnical Report. Subgrade soils within 18 inches of pad grade shall have a moisture content of at least 3 percent optimum immediately prior to placing the slab concrete.

3.8 CLEAN-UP

- A. Disposal: Haul away rubbish, debris, and rocks from site promptly and dispose of legally. Burning rubbish on site is prohibited.
- B. Dust and Noise Abatement: During entire period of construction keep area and material being loaded sprinkled to reduce dust in air and annoyance to premises and surrounding property.

END OF SECTION

SECTION 13 11 02 - SWIMMING POOL CONCRETE

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Forming for cast-in-place concrete and shotcrete associated with swimming pools and pool decks.
- B. Reinforcement for cast-in-place concrete and shotcrete associated with swimming pools and pool decks.
- C. Cast-in-place concrete for swimming pool structures. Do not use waterproofing admixture of any kind.
- D. Cast-in-place concrete for swimming pool decks with Xypex C-500 crystalline waterproofing admixture. Waterproofing admixture for swimming pool decks only.
- E. Provide labor, materials and equipment as required to install sealant for all pool deck expansion joints, or any other caulking, as indicated on the aquatic Drawings and herein specified.

1.2 QUALITY ASSURANCE

- A. Qualifications of Workers:
 - 1. The entity performing the work of this Section shall have been successfully engaged in the respective trade for at least five (5) years immediately prior to commencement of the Work.
 - 2. For actual construction operations, use only trained and experienced workers with a minimum of three (3) years experience with the materials and methods specified.
 - 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with a minimum of five (5) years experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.
- B. Standards:
 - 1. In addition to complying with the California Building Code (latest edition), comply with all pertinent recommendations contained in, "Guide to Formwork for Concrete" Publication ACI 347R-14 of the American Concrete Institute.
 - 2. In addition to complying with California Building Code (latest edition), comply with all pertinent recommendations contained in "Guide to Presenting Reinforcing Steel Design Details," Publication ACI 315R-18 of the American Concrete Institute.
 - 3. In addition to complying with all local codes and regulations, comply with all pertinent recommendations contained in American Society for Testing and materials (ASTM); ASTM C 920 "Standard Specification for Elastometric Joint Sealants."
- C. Tolerances: Construct all swimming pool concrete straight, true, plumb and square within a tolerance horizontally of one in 200 and vertically of one in 2000.

1.3 SUBMITTAL AND SUBSTITUTIONS

- A. Provide submittals in conformance with the requirements of Section 01 33 00. Requests for substitution shall conform to requirements of Article 1.10.A of Section 13 11 00.
- B. Samples and Certificates, Concrete Reinforcement:
 - 1. Provide all data and access required for testing as described in Section 01 45 23 of the Specifications.
 - 2. All material shall bear mill tags with heat number identification. Mill analysis and report shall be made available upon request.
 - 3. Rebar samples shall be taken from bundles as delivered from the mill with the bundles identified as to heat number and the accompanying mill certificate. One tensile test and one bend test shall be made from a sample from each 10 tons or fraction thereof of each size of reinforcing steel.
 - 4. Design mix from batch plant demonstrating previous use history and associated strengths at 28 days.
 - 5. The Contractor shall submit a mix design stamped and signed by a licensed engineer for approval by the Owner's Representative prior to any placement of concrete.
 - 6. The Contractor shall submit a separate mix design stamped and signed by a licensed engineer for the swimming pool decks which contains the specified Xypex C-500 crystalline waterproofing admixture for approval by the Owner's Representative prior to any placement of concrete.
- C. Submit proof of qualifications as specified in Article 1.2.A of this Section.
- D. Submit reinforcing shop drawings for pool walls, gutters, floors, dike walls and balance tank, etc. as shown on the construction drawing.

1.4 PRODUCT HANDLING

- A. Delivery: Deliver materials to the Project Site in the manufacturer's original unopened containers with all labels intact and legible.
- B. Storage: Store materials under cover in a manner to prevent damage and contamination, and store only the specified materials at the Project Site.
- C. Protection: Use all means necessary to protect the swimming pool concrete before, during, and after installation and to protect the installed Work specified in other Sections.
- D. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner.

PART 2 - PRODUCTS

2.1 CONCRETE FORMWORK

- A. Form Materials:
 - 1. Form Lumber: All form lumber in contact with exposed concrete shall be new except as allowed for reuse of forms in Part 3 of this Section, and all form lumber shall be one of

the following, a combination thereof, or an equal approved in advance by the Owner's Representative.

- a. "Plyform," Class I or II, bearing the label of the Douglas Fir Plywood Association; "Inner-Seal" Form as manufactured by Louisiana-Pacific, or approved equal.
 - b. Douglas Fir-Larch, number two grade, seasoned, surfaced four sides.
2. Form Release Agent: Colorless, non-staining, free from oils; chemically reactive agent that shall not impair bonding of paint or other coatings intended for use.
- B. Ties and Spreaders:
1. Type: All form ties shall be a type which do not leave an open hole through the concrete and which permits neat and solid patching at every hole.
 2. Design: When forms are removed, all metal reinforcement shall be not less than two (2) inches from the finished concrete surface.
 3. Wire Ties and Wood Spreaders: Do not use wire ties or wood spreaders.
- C. Alternate Forming Systems: Alternate forming systems may be used subject to the advance approval of the Owner's Representative.

2.2 CONCRETE REINFORCEMENT

- A. Bars: Bars for reinforcement shall conform to "Specifications for Deformed Carbon-Steel Bars for Concrete Reinforcement," ASTM A-615, Grade 60.
- B. Wire Fabric: Wire fabric shall conform to "Specifications for Carbon Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete," ASTM A1064.
- C. Tie Wire: Tie wire for reinforcement shall conform to "Specifications for Carbon Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete," ASTM A1064 black annealed 16-gauge tie wire.

2.3 CAST-IN-PLACE CONCRETE

- A. Concrete:
1. All concrete, unless otherwise specifically permitted by the Owner's Representative, shall be transit-mixed in accordance with ASTM C94. Concrete for water retaining structures that do not receive a waterproofing finish such as ceramic tile or swimming pool plaster shall receive a topical waterproofing finish.
 2. The control of concrete production shall be under the supervision of a recognized testing agency, selected by the Owner in accordance with Section 01 45 23 of the Specifications.
 3. Quality: All concrete shall have the following minimum compressive strengths at twenty-eight (28) days and shall be proportioned within the following limits
 - a. 4,000 psi minimum compressive strength for cast-in-place concrete swimming pool structures.
 - b. 4,000 psi minimum compressive strength for cast-in-place swimming pool decks with Xypex C-500 waterproofing admixture.
 - c. 1" maximum size aggregate.
 - d. 6.0 minimum sacks of cement per cubic yard.*
 - e. Maximum water to cement ratio of 0.40- 0.45 maximum.
 - f. 4" maximum slump.
 - g. Xypex Admix C-500 2% - 2.5% by weight of cement content. Contact Xypex

Technical Services to confirm dosage. (To be used for swimming pool decks only.)

* For estimate only: to be determined by mix design.

4. Cement: All cement shall be Portland Cement conforming to ASTM C-150, Type II or V and shall be the product of one manufacturer.
 5. Aggregates:
 - a. Shall conform to “Standard Specifications for Concrete Aggregates,” ASTM C33, except as modified herein.
 - b. Coarse Aggregate: Clean sound washed gravel or crushed rock. Crushing may constitute not more than 30% of the total coarse aggregate volume. Not more than 5% flat, thin, elongated or laminated material nor more than 1% deleterious material shall be present. 1" aggregate graded from 1/4" to 1", fineness modulus 6.90 to 7.40. 1-1/2" graded from 1/2" to 1-1/2", fineness modulus 7.80 to 8.20.
 - c. Fine Aggregate: Washed natural sand of hard, strong particles and shall contain not more than 1% of deleterious material, fineness modulus 2.65 to 3.05.
 - d. Aggregate must be certified, non-expansive from a “known” good source.
 6. Water: ASTM C1602 Clean, fresh, free from acid, alkali, organic matter or other impurities liable to be detrimental to the concrete (potable).
 7. Admixtures: Admixtures shall be used upon approval of the Owner's Representative.
 - a. Air-entraining admixture: Conform to ASTM C260.
 - b. Water-reducing admixture: Conform to ASTM C494.
 - c. Waterproofing admixture for swimming pool decks only: Xypex Admix C-500, No substitutions permitted. Conform to ASTM C494.
 8. Xypex Admix C-500 Dosage: To be used for swimming pool decks only.
 - a. General: Xypex Admix must be added to concrete mix at time of batching. It is important to obtain a homogeneous mixture of Xypex Admix with the concrete. Do not add dry Admix powder directly to wet mixed concrete as this could cause clumping and thorough dispersion may not occur.
 - b. Dosage Rate: Under normal conditions, the crystalline waterproofing powder shall be added to the concrete mix at the following rates:
 - 1) Xypex Admix C-500 2% – 2.5% by weight of cement content
 - c. Weather Conditions: For mixing, transporting and placing concrete under conditions of high temperature or low temperature, follow concrete practices such as those referred to in ACI 305R (Hot Weather Concreting) and ACI 306R (Cold Weather Concreting) or other applicable standards.
 - d. Concrete Batching & Mixing Procedures: Procedures for the addition of Xypex admixture will vary according to type of batch plant operation and equipment. Prior to the placement of any concrete, the concrete batch plant and the contractor shall be responsible to consult with the local Xypex representative concerning additional procedures for the addition, mixing and to confirm dosage.
 Note: For enhanced chemical protection or for meeting specific project requirements or where the concrete mix design contains higher than 25% type F fly ash content or includes a portland cement/slag cement/type C fly ash blend, consult with manufacturer or its authorized representative to determine appropriate dosage rates.
- B. Construction Joints: Use keyform for slab pour joints. Either preformed galvanized or PVC construction joint forms of a standard manufacturer may be used. Install per manufacturer's recommendations and tool edges of slabs.

- C. Waterstops: PVC bulb-type for use between concrete pours / lifts, conforming with ASTM D 570, D 624, and D 638. Provide in configuration(s) as recommended by manufacturer for specific application. Greenstreak, W.R. Meadows, or approved equal.
- D. Curing Materials:
 - 1. Liquid Membrane (covered slab): Chlorinated rubber membrane forming, curing-sealing compound conforming to ASTM C309.
 - 2. Liquid Membrane (exposed slab): Clear methyl and butyl methacrylate non-staining, membrane forming, curing-sealing compound conforming to ASTM C309.
- E. Cement Grout and Drypack:
 - 1. Cement Grout: Mix 1 part by volume of Portland Cement, 1/2 part by volume of water and fine aggregate enough to make mixture flow under its' own weight.
 - 2. Drypack: Mix 1 part by volume of Portland Cement, 1/2 part by volume of water and fine aggregate enough to make a stiff mix that will mold into a ball. Mix no more than can be used in 30 minutes.

2.4 JOINT SEALANT MATERIALS

- A. Caulking: Multipart, non-sag gun grade polyurethane based sealant meeting the requirements of CBC Ch. 35-ASTM C920-14a, Type S or M, Mamemco International, Pecora, Sika Corp., Sonneborn Building Products, Tremco or approved equal. Self leveling caulking materials are not allowed.
- B. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- C. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- D. Sealant Backer Rod: Provide compressible polyethylene or polyurethane backer rod as recommended by the sealant manufacturer.
- E. Bond Breaker Tape: Provide polyethylene tape or other plastic tape as recommended by sealant manufacturer, to be applied to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper performance of sealant.
- F. Sand: Cover the surface of the caulking with #30 silica sand.

2.5 OTHER MATERIALS

- A. All other materials, not specifically described but required for proper completion of the work of this Section, shall be as selected by the Contractor subject to the advance review by the Owner's Representative.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
1. Prior to all Work of this Section, carefully inspect the installed Work of other trades and verify that all such Work is complete to the point where this installation may properly commence.
 2. Verify that all Work may be constructed in accordance with all applicable codes and regulations, the referenced standards, the original design, and in accordance with site specific Geotechnical Report.
- B. Discrepancies:
1. In the event of discrepancy, immediately notify the Owner's Representative.
 2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
 3. Failure to notify the Owner's Representative and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive work.

3.2 CONCRETE FORMWORK

- A. Construction of Forms:
1. General: Construct all required forms to be substantial, sufficiently tight to prevent leakage of concrete paste, and able to withstand excessive deflection when filled with wet concrete.
 2. Layout:
 - a. Form for all required cast-in-place concrete to the shapes, sizes, lines and dimensions indicated on the Drawings.
 - b. Exercise particular care in the layout of forms to avoid necessity for cutting concrete after placement.
 - c. Make proper provisions for all openings, offsets, recesses, anchorages, blocking and other features of the Work as shown or required.
 - d. Perform all forming required for Work of other trades and do all cutting and repairing of forms required to permit such installation.
 - e. Carefully examine the Drawings and Specifications and consult with other trades as required relative to providing for pipe and conduit penetrations, reglets, chases and other items in the forms.
 3. Imbedded Items: Set all required steel frames, angles, bolts, inserts and other such items required to be anchored in the concrete prior to concrete being placed.
 4. Bracings:
 - a. Properly brace and tie the forms together so as to maintain position and shape and to ensure safety to workmen.
 - b. Construct all bracing, supporting members and centering of ample size and strength to safely carry, without excessive deflection, all dead and live loads to which they may be subjected.
 - c. Properly space the forms apart and securely tie them together, using metal spreader ties that give positive tying and accurate spreading.
 5. Wetting: Keep forms sufficiently wetted to prevent joints from opening up before concrete is placed.
- B. Plywood Forms:
1. Design: Nail the plywood panels directly to studs and apply in a manner to minimize the number of joints.

2. Joints: Make all panel joints tight butt joints with all edges true and square.
- C. Footing Forms:
1. Wood Forms: All footing forms shall be wood unless otherwise specifically approved by the Owner's Representative, or as specified in paragraph 3.2(C)(2).
 2. Earth Forms:
 - a. Side walls for footings may be of earth provided the soil will stand without caving and the sides of the bank are made with a neat cut to the minimum dimensions indicated on the Drawings.
 - b. For excavation and backfill of earth forms, conform with applicable provisions of Section 13 11 01.
- D. Reuse of Forms:
1. Reuse of forms shall be subject to advance approval of the Owner's Representative.
 2. Except as specifically approved in advance by the Owner's Representative, reuse of forms shall in no way delay or change the schedule for placement of concrete from the schedule obtainable if all forms were new.
 3. Except as specifically approved in advance by the Owner's Representative, reuse of forms shall in no way impart less structural stability to the forms nor less acceptable appearance to finished concrete.
- E. Removal of Forms:
1. General:
 - a. In general, side forms of footings may be removed seven (7) days after placement of concrete, but time may be extended if deemed necessary by the Owner's Representative.
 - b. Forms for footings, foundations, grade beams, slabs, walls, and other formed concrete may be removed fourteen (14) days after placement of concrete.
 2. Removal:
 - a. Use all means necessary to protect workers, passersby, the installed Work of other trades and the complete safety of the structure.
 - b. Cut nails and tie wires or form ties off flush, and leave all surfaces smooth and clean.
 - c. Remove metal spreader ties on exposed concrete by removing or snapping off inside the wall surface and pointing up and rubbing the resulting pockets to match the surrounding areas.
 - d. Flush all holes resulting from the use of spreader ties and sleeve nuts using water, and then solidly pack throughout the wall thickness with cement grout applied under pressure by means of a grouting gun; grout shall be one part Portland Cement to 2-1/2 parts sand; apply grout immediately after removing forms.

3.3 CONCRETE REINFORCEMENT

- A. Bending:
1. General:
 - a. Fabricate all reinforcement in strict accordance with the Drawings.
 - b. Do not use bars with kinks or bends not shown on the Drawings.
 - c. Do not bend or straighten steel in a manner that will injure the material. (When opposite end is already encased in concrete.)
 2. Design:
 - a. Bend all bars cold.

- b. Make bends for stirrups and ties around a pin having a diameter of not less than four (4) times the minimum thickness of the bar (#3 - #5) per ACI.
- c. Make bends for other bars, including hooks, around a pin having a diameter of not less than six (6) times the minimum thickness of the bar.

B. **Placing:**

1. **General:** Before the start of concrete placement, accurately place all concrete reinforcement, positively securing and supporting by concrete blocks, metal chairs or spacers, or by metal hangers.
2. **Clearance:**
 - a. Preserve clear space between bars of not less than one and one-half (1-1/2) times the nominal diameter of the round bars.
 - b. In no case let the clear space be less than one and one-half (1-1/2) inches nor less than one and one-third (1-1/3) times the maximum size of the aggregate.
 - c. Provide the following minimum concrete covering of reinforcement:
 - 1) Concrete deposited against earth: three (3) inches minimum.
 - 2) Concrete below grade deposited against forms: two (2) inches minimum.
 - 3) Concrete elsewhere: As indicated on Drawings or otherwise approved by the Owner's Representative.
3. **Splicing:**
 - a. **Horizontal Bars:**
 - 1) Place bars in horizontal members with minimum lap at splices sufficient to develop the strength of the bars.
 - 2) Bars may be wired together at laps except at points of support of the member, at which points preserve clear space described above.
 - 3) Whenever possible, stagger the splices of adjacent bars.
 - 4) Splice forty (40) bar diameters minimum.
 - 5) Provide non-contact lap slices for shotcrete.
 - b. **Wire Fabric:** Make all splices in wire fabric at least one and one-half (1-1/2) meshes wide.
 - c. **Other Splices:** Make only those other splices that are indicated on the Drawings or specifically approved by the Owner's Representative.
4. **Dowels:** Place all required steel dowels and securely anchor them into position before concrete is placed.
5. **Obstructions:** In the event conduits, piping, inserts, sleeves and other items interfere with placing reinforcement as indicated on the Drawings or otherwise required, immediately consult with the Owner's Representative and obtain approval of a new procedure prior to placing concrete.

- C. **Cleaning Reinforcement:** Steel reinforcement, at the time concrete is placed around it, shall be free from rust scale, loose mill scale, oil, paint and all other coatings which will destroy or reduce the bond between steel and concrete. Bend down all tie wire away from the top of the pool deck. Maintain a 2" clear from top of concrete to the tie wire.

3.4 SHOTCRETE REINFORCEMENT

- A. The maximum size of reinforcement shall be No. 5 bars unless it can be demonstrated by preconstruction tests that adequate encasement of larger bars can be achieved. When No. 5 or smaller bars are used, there shall be a minimum clearance between parallel reinforcement bars of 2-1/2 inches (64 mm). When bars larger than No. 5 are permitted, there shall be a minimum

clearance between parallel bars equal to six diameters of the bars uses. When two curtains of steel are provided, the curtain nearest the nozzle shall have a minimum spacing equal to 12 bar diameters and the remaining curtain shall have a minimum spacing of six bar diameters.

- B. Lap splices in reinforcing bars shall be by the non-contact lap splice method with at least 2 inches clearance between bars. The enforcement agency may permit the use of contact lap splices when necessary for the support of the reinforcing provided it can be demonstrated by means of preconstruction testing, that adequate encasement of the bars at the splice can be achieved, and provided that the splices are placed so that a line through the center of the two spliced bars is perpendicular to the surface of the shotcrete work.

3.5 CAST-IN-PLACE CONCRETE

A. Conveying and Placing Concrete:

1. Before placing concrete, mixing and conveying equipment shall be well cleaned, and the forms and space to be occupied by concrete shall be thoroughly cleaned and wetted. Ground water shall be removed until the completion of the work.
2. No concrete shall be placed in any unit of work until all formwork has been completely constructed, all reinforcement has been secured in place, all items to be built into concrete are in place, and form ties at construction joints tightened.
3. Concrete shall be conveyed from mixer to place of final deposit in such a way to prevent the separation or loss of ingredients. It shall be placed as nearly as practicable in its' final position to avoid rehandling or flowing. Concrete shall not be dropped freely where reinforcing bars will cause segregation, nor shall it be dropped freely more than six (6) feet. Use tremies, spouts and dump boxes in deep sections. Vibrators are not acceptable for facilitating concrete transport.
4. Concrete shall be tamped and spaded to insure proper compaction into all parts of forms and around reinforcement. A mechanical vibrator shall be used to thoroughly compact the concrete. Vibration must be by direct action in the concrete and not against forms or reinforcement.
5. Mixing and transport time as indicated in ASTM C94 is required. If air temperatures are between 85° and 90° F the delivery time is to be reduced to 75 minutes. When air temperatures is in excess of 90° F the delivery time should be reduced to 60 minutes.
6. Truck mixes without batch certificates will be rejected.

- B. Construction Joints / Expansion Joints: Construction joints and expansion joints shall be provided at locations and in the manner shown on the Drawings. With exception of existing concrete / new shotcrete joints, use PVC bulb-type waterstops appropriate for design condition between all concrete pours / lifts to avoid cold joints. Waterstops shall be placed in such a way to protect reinforcing steel from rust and oxidation. All expansion joints must be the full depth of the concrete section in which they are located.

- C. Slab Finishes: Concrete slabs shall be compacted and screeded uniformly to grades shown. Push large aggregates below the surface with a screen tamper, screed and bull float. As soon as the surface becomes workable, it shall be wood floated, then finished as indicated on the Drawings to a uniform smooth, true surface in a neat and workmanlike manner. Carefully coordinate slab finish requirements with other trades (ceramic tile, pool plaster) to insure concrete finish is appropriate substrate for final finish material.

1. Contractor shall provide three mock-up deck samples, minimum 3' x 3', with a wedge anchor installed in one sample. These (3) samples shall be constructed; one with a light broom finish, one (1) with a medium broom finish and one (1) with a heavy broom finish

for determination and selection of an appropriate deck finish. Each sample shall be edged on all four sides to demonstrate a 3/4" radius edge. Anchor installation shall demonstrate acceptable interface between anchor and the top of deck. Deck samples shall remain on job site through final inspection for reference.

2. Pool Floor Slab: Heavy Wire Broom Finish.

D. Protection and Curing:

1. Concrete shall be protected from injurious action of the elements and defacement of any nature during construction.
2. All forms must be kept wet to prevent drying out of the concrete.
3. All concrete surfaces including footings must be kept wet for at least seven (7) days after concrete is placed.
4. Apply the appropriate curing materials, as specified in 2.03 of this Section, immediately after finishing slabs. Application shall be as specified by the manufacturer.

E. Form Removal:

1. Take care in removing forms so that surfaces are not marred or gouged and that corners are true, sharp and unbroken.
2. No steel spreaders, ties or other metal shall project from or be visible on any concrete surfaces.

F. Defective Work:

1. Should the strength of any concrete for any portion of the work indicated by tests of molded cylinders and core tests fall below minimum 28 days strength specified or indicated, concrete will be deemed defective work and shall be replaced.
2. Concrete work that is not formed as indicated, is not true to intended alignment, not plumb or level where so intended, not true to intended grades or elevations, not true to specified or selected finish, contains sawdust shavings, wood, or embedded debris, which exhibits cracks or contains fine or coarse sulfide particles, or expansive aggregates detrimental to performance or appearance of the concrete shall be deemed defective.
3. Promptly perform work required to replace and properly clean (by sandblasting if necessary) any defective concrete panels (control joint or expansion joint to control joint or expansion joint), at Contractor's expense, including all expense of additional inspection, tests, or supervision made necessary as a result of defective concrete.

3.6 EXPANSION JOINTS

- A. Temperatures: Do not install sealants when air temperature is less than 40°F.
- B. Tooling: Tool exposed joints to a slightly concave surface using slicking materials recommended by the manufacturer. The tooling procedure shall press sealant against the sides of the joint. No materials shall be left "feathered" out or smeared on the abutting materials. Completed joints shall have a uniform professional appearance.
- C. Joint Construction: Sealant joint width, thickness and cross-sectional profile to be constructed in strict accordance with the sealant manufacturer's recommendations.
- D. Sand: At the appropriate time cover the sealant with sand to provide a sanded finish.

3.7 CLEAN-UP

- A. Upon completion of the Work of this Section, immediately remove all swimming pool concrete materials, debris and rubbish occasioned by this Work to the approval of the Owner's Representative.

END OF SECTION

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SECTION 13 11 03 - SWIMMING POOL SHOTCRETE

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials and equipment as required to install wet mix shotcrete for swimming pool structures as indicated on the Drawings and herein specified.

1.2 QUALITY ASSURANCE

- A. Qualifications of Workers:
 - 1. The entity performing the work of this Section shall have been successfully engaged in the respective trade for at least five (5) years immediately prior to commencement of the Work.
 - 2. For actual construction operations, use only trained and experienced workers with a minimum of three (3) years experience with the materials and methods specified.
 - 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with a minimum of five (5) years experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.
- B. Standards: Except as otherwise indicated, provide shotcrete per American Concrete Institute Standard ACI 506. In addition, conform to recommendations contained in "Shotcrete," Brochure G-84 as published by the Guniting Contractors Association, Sylmar, California and the California Building Code (latest edition).
- C. Mix Design: The Contractor shall submit a mix design stamped and signed by a licensed engineer for approval by the Owner's Representative prior to any placement of shotcrete. Mix design shall indicate source of aggregate and brands of cement and admixtures used. All mix designs shall take character of locally available aggregate into consideration and make adjustments as necessary to conform with specified design criteria.
- D. Testing and Inspection: A test panel shall be shot, cured, cored or sawn, examined and tested (representing the most congested and difficult project scenario) prior to commencement of the project in accordance with ASTM C1140. All project conditions and personnel shall be represented in the test panel. Additionally, one test panel shall be provided for each 50 yards (or portion thereof) of shotcrete placed for each day or each nozzleman, whichever is greater. The size of the strength test panel shall be per the direction of the Special Shotcrete Inspector. At least three (3) cores shall be taken from each test panel. (At least three (3) cores shall be taken from the completed work for each day of shotcrete operation.) Testing shall be performed by the Owner's designated Testing Lab and comply with Section 1908A.10, California Building Code. Continuous inspection of the shotcrete operation by a deputy inspector provided by the Owner shall be required. Inspection of shotcrete work shall comply with Section 1908A of California Building Code, and coring, sampling, soaking and testing per 1908A.5 and 1908A.10 of California Building Code. Contractor shall provide test panels for all required tests. The Contractor shall provide the Owner and Testing Lab 48 hours notice before the start of shotcrete operations.

- E. Tolerances: Construct all swimming pool shotcrete straight, true, plumb and square within a tolerance horizontally of one in 200 and a tolerance vertically of one in 2000.

1.3 SUBMITTALS AND SUBSTITUTIONS

- A. Provide submittals in conformance with the requirements of Section 01 33 00 and ACI 506.2. Requests for substitution shall conform with requirements of Article 1.10.A of Section 13 11 00.
- B. Materials List: Within thirty (30) days after issuance of Notice to Proceed, and before shotcrete materials are delivered to the project site, submit to the Owner's Representative a complete list of materials proposed to be used in this portion of the Work, showing manufacturer's name and catalog number of all items such as admixtures and curing membranes, and the name and address of the supplier of cement and aggregate to be used.
- C. Submit proof of qualifications as specified in Article 1.2.A of this Section.

1.4 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect shotcrete materials before, during and after installation and to protect the installed Work specified in other Sections.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner's Representative and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cement: Cement shall be Type II Portland Cement conforming to ASTM C150. Cement type shall be the same for all shotcrete work.
- B. Aggregate: ASTM C33, washed hard dense durable clean sharp sand from approved pit, free of organic matter and opaline, feldspar, or silicious magnesium substances and containing not more than 3% by weight of deleterious substances. Maximum size aggregate for shotcrete is $\frac{3}{4}$ " per CBC 1908A.3. When tested for organic impurities by ASTM C40 method, fine aggregate color not darker than reference standard color. When tested for soundness by ASTM C88 method, grading No. 2 of ASTM C1436, loss after 5 cycles not over 10% of fine aggregate.
- C. Water: Potable, clean, fresh, free from acid, alkali, organic matter or other impurities liable to be detrimental to the shotcrete.
- D. Admixtures: Admixtures shall conform to ASTM C1141 and only be used upon approval of the Owner's Representative.

PART 3 - EXECUTION

3.1 EXECUTION

A. Inspection:

1. Prior to all Work of this Section carefully inspect the installed Work of other trades and verify that all such Work is complete to the point where this installation may properly commence.
2. Verify that items to be imbedded in shotcrete are in place and that shotcrete may be placed to the lines and elevations shown on the Drawings, with all required clearance from reinforcement.

B. Discrepancies:

1. In the event of discrepancy, immediately notify the Owner's Representative.
2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
3. Failure to notify the Owner's Representative and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive the Work.

3.2 PREPARATION

A. General:

1. Thoroughly clean all areas where shotcrete is to be placed to insure proper bonding of shotcrete.
2. Where shotcrete is to be placed against smooth surfaces (i.e., cast-in-place concrete), sandblast surfaces to receive shotcrete to provide clean aggregate surface, thereby insuring proper bond between materials.

- B. Ground Wires: Adequate ground wires, to be used as screeds, shall be installed to establish the thickness and surface planes of the shotcrete work. Ground wires shall be placed so that they are tight and true to line and grade and in such a manner that they can be easily tightened.

3.3 PROPORTIONING AND MIXING

- A. Accurately control proportion of water to Portland cement to produce thorough and uniform hydration of the shotcrete that, when shot, forms a homogeneous mass containing neither sags nor dry sand formation. Proportion by mass per ASTM C94 or by volume per ASTM C685.

- B. Shotcrete shall have a minimum compressive strength of 4,000 PSI at 28 days. Shotcrete material shall have a water/cement ratio of 0.40-0.45 per ACI 506R, Chapter 6, Proportioning and Preconstruction Testing; Section 6.3.3, Wet Mix Process.

- C. Discontinue shotcrete work if the time between the addition of mixing water to cement and aggregate, or cement to aggregates, and placement of shotcrete exceeds ninety (90) minutes when the ambient temperature is below 85 degrees Fahrenheit, or exceeds sixty (60) minutes when the ambient temperature is above 85 degrees Fahrenheit. Batch, mix and deliver wet-mixture shotcrete per ASTM C94 or C685.

- D. Hot Weather Shotcreting – Unless otherwise specified, do not place shotcrete when shotcrete temperature is above 95°F, unless prequalification testing shows that the required quality of materials can be achieved at high temperatures. The temperature of reinforcement and receiving

surfaces shall be below 90°F prior to shotcrete placement.

- E. Cold Weather Shotcreting – Unless otherwise specified, shooting may proceed when ambient temperature is 40°F and rising. Stop shooting when ambient temperature is 40°F and falling, unless measures are taken to protect the shotcrete. Shotcrete material temperature, when shot, shall not be less than 50°F. Do not place against frozen surfaces

3.4 SHOTCRETE PLACING, FINISHING, AND CURING

- A. Operations: Utilize a standard type of air compressor, capable of providing a minimum of 250 cubic feet of air per minute per nozzle.
- B. Placing: Except when shooting reinforcing, hold the nozzle perpendicular to and 2-1/2 to 3 feet from surface. At reinforcing bars, hold the nozzle so as to direct shotcrete behind the bars, and shoot each side of each bars separately. A nozzleman's helper equipped with an air jet shall precede the nozzle and blow out rebound or sand lodged behind bars, on forms, or placed shotcrete. Placing shotcrete horizontal members from the top is not allowed unless approved methods are employed to eliminate all rebound. Material shall emerge from the nozzle in a uniform flow. If flow becomes intermittent for any reason, direct the nozzle away from the surface until the flow is again steady and constant. Do not reuse rebound or loose sand for any purpose.
- C. Puddled Shotcrete: Use of "puddled shotcrete" in which the air pressure is reduced and the water content is increased to facilitate placing in difficult locations is not allowed. Do not place shotcrete where nozzle stream cannot impinge directly on the involved surface. Where difficult shooting conditions occur, obtain proper results by maintaining correct air pressure and water ratio and reduce supply of material.
- D. Construction Joints: Form joints with sloping beveled edges. Clean and dampen the hardened joint surfaces before placing additional shotcrete. Square edged construction joints are not allowed. The film of laitance which forms on the surface of the shotcrete shall be removed within approximately two hours after application by brushing with a stiff broom. If this film is not removed within two hours, it shall be removed by thorough wire brushing or sand blasting. Construction joints over eight hours old shall be thoroughly cleaned with air and water prior to receiving shotcrete.
- E. Finishing: Rod exposed surfaces to true planes and lines on reaching the thickness and plane established by forms and ground wires. Tamp and wood float surfaces level and provide a rough raked finish. Carefully coordinate finish requirements with other trades (ceramic tile, pool plaster) to ensure shotcrete finish is appropriate substrate for final finish material.
- F. Curing: Keep shotcrete continuously damp for not less than seven (7) days after placing. Use sealed curing sheeting or other approved curing method where water curing is not feasible. Do not use curing compound of any kind.

3.5 DEFECTIVE WORK

- A. Cut out, remove and replace, or repair to the satisfaction of the Owner's Representative, shotcrete not meeting minimum strength, not true, plumb or level, not to required elevations, containing cracks detrimental to performance or appearance, containing shavings, debris or

with honeycombs or voids.

- B. Promptly perform Work required to repair, patch, replace, render properly cleaned surfaces (by sandblasting if necessary) or otherwise make good any defective shotcrete at Contractor's expense, including all expense of additional inspection, tests, or supervision made necessary as a result of defective shotcrete.

3.6 CLEAN-UP

- A. Upon completion of the Work of this Section, immediately remove all swimming pool shotcrete materials, debris and rubbish occasioned by this work to the approval of the Owner's Representative.

END OF SECTION

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SECTION 13 11 04 - SWIMMING POOL CERAMIC TILE

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish and install all swimming pool ceramic tile detailed on the Drawings, including, but not limited to, the following:
1. Gutter Bullnose / Handhold
 2. Waterline and Deck Tile
 3. Depth / Caution Marker Tile (At Pool Deck)
 4. Lane Line / Target Tile / Step Trim Tile

1.2 QUALITY ASSURANCE

- A. Qualifications of Workers:
1. The entity performing the work of this Section shall have been successfully engaged in the respective trade for at least five (5) years immediately prior to commencement of the Work.
 2. For actual construction operations, use only trained and experienced workers with a minimum of three (3) years' experience with the materials and methods specified.
 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with a minimum of five (5) years' experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.
- B. Standards: In addition to complying with all pertinent codes and regulations:
1. Manufacture of all tile shall be in accordance with ANSI A-137.1-1976.
 2. Install ceramic tile in accordance with the recommendations contained in 2022 Handbook for Ceramic Tile Installation of the Tile Council of America, Inc.
- C. Tolerances: Install all swimming pool ceramic tile straight, true, plumb and square within a tolerance horizontally of one in 200 and a tolerance vertically of one in 500. Waterline and gutter bullnose tile shall be level to 1/8" (+/- 1/16") around entire perimeter of swimming pool(s).

1.3 SUBMITTALS AND SUBSTITUTIONS

- A. Provide submittals in accordance with the requirements of Section 01 33 00. Requests for substitution shall conform to requirements of Article 1.10.A of Section 13 11 00.
- B. Samples: Submit samples of each color and pattern in the specified groups. Character samples can be representative for review prior to screening of actual tile.
- C. Master Grade Certificate: Prior to opening ceramic tile containers, submit a Master Grade Certificate, signed by the manufacturer of the tile used and issued when the shipment is made, stating the grade, kind of tile, identification marks for the tile containers, and the name and

location of the Project.

- D. Specifications: Submit manufacturer's recommended installation specifications for the Work.
- E. Submit proof of qualifications as specified in Article 1.2.A of this Section.

1.4 PRODUCT HANDLING

- A. Delivery: Deliver all materials to the Project Site in the manufacturer's original unopened containers with all labels intact and legible.
- B. Storage: Store all materials under cover in a manner to prevent damage and contamination, and store only the specified materials at the Project site.
- C. Protection: Use all means necessary to protect swimming pool ceramic tile before, during and after installation and to protect the installed Work specified in other Sections.
- D. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner.

PART 2 - PRODUCTS

2.1 TILE

- A. Gutter Bullnose / Handhold:
 1. Material: All gutter bullnose tile shall be unglazed ceramic mosaic tile with absorption rate of less than 1% as manufacturer by Dal-Tile or approved equal.
 2. Size: 1 x 2 inches. C-701
 3. *Color: Dal Tile #D-621 'Nautical Blue' throughout the body of the tile.
- B. Waterline and Deck Tile:
 1. Material: All gutter bullnose tile shall be unglazed ceramic mosaic tile with absorption rate of less than 1% as manufacturer by Dal-Tile or approved equal.
 2. Size: 1 x 1 inches.
 3. *Color: Dal Tile #D-621 'Nautical Blue' throughout the body of the tile.
- C. Depth / Caution Marker Tile (At Pool Deck):
 1. Material: Group 3 quality, frost proof unglazed ceramic mosaic tile with absorption rate of less than 1% as manufactured by Dal-Tile or approved equal. Contact Kylee Midura kylee.midura@daltile.com (858) 344-0019.
 2. Size: 1 x 1 inches.
 3. Color: Dal-Tile #D-617, 'Arctic White' letters and numbers on #D-621, 'Nautical Blue' field.
- D. Lane Line / Target Tile / Step Trim Tile:
 1. Material: Manufacturer provided epoxy paint.
 2. Size: Per plan.
 3. Colors: Black in 25-yard direction, Blue in 50 Meter direction. Verify color with Architect and Owner prior to installation.

2.2 MORTAR (Provide typical stainless steel pool mortars for tile to PVC liner and stainless steel surfaces).

- A. All tile grout shall be waterproof high performance epoxy grout meeting high durability and stain protection performance requirements of ANSI A118.3 providing a 25yr warranty. Grout color shall be grey for dark backgrounds, white for light backgrounds (verify colors with Architect and Owner).
- B. Material: Mapei Kerapoxy CQ Premium two component Epoxy Grout as recommended by Myrtha

2.3 GROUT

- A. All tile grout shall be waterproof high performance epoxy grout meeting high durability and stain protection performance requirements of ANSI A118.3 providing a 25yr warranty. Grout color shall be grey for dark backgrounds, white for light backgrounds (verify colors with Architect and Owner)
- B. Material: Mapei Kerapoxy CQ Premium two component Epoxy Grout with color coated quartz as recommended by Myrtha.

2.4 OTHER MATERIALS

- A. All other materials, not specifically described but required for a complete and proper installation of ceramic tile as indicated on the Drawings, shall be new, first quality of their respective kinds, and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
 - 1. Prior to all Work of this Section, carefully inspect the installed Work of other trades and verify that all such Work is complete to the point where this installation may properly commence.
 - 2. Verify that ceramic tile can be installed in accordance with the original design and all referenced standards.
- B. Discrepancies:
 - 1. In the event of discrepancy, immediately notify the Owner's Representative.
 - 2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
 - 3. Failure to notify the Owner's Representative and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive its Work.

3.2 INSTALLATION

- A. Method:
 - 1. Install all ceramic tile in strict accordance with installation method P601-90 of the 2022 Handbook for Ceramic Tile Installation of the Tile Council of America, Inc.
 - 2. Be certain to install all ceramic tile perfectly level, flush, plumb, and to the finish grades and elevations indicated on the Drawings.

- B. Interface:
 - 1. Carefully establish and follow the required horizontal and vertical elevations to insure proper and adequate space for the work and materials of other trades.
 - 2. Coordinate and cooperate as required with other trades to insure proper and adequate interface of ceramic tile Work with the Work of other trades.

3.3 GROUTING

- A. Follow grout manufacturer's recommendations as to grouting procedures and precautions.

- B. Remove all grout haze, observing grout manufacturer's recommendations as to use of acid and chemical cleaners.

3.4 EXTRA STOCK

- A. Provide one (1) unopened box of extra tile for 2.1A, and 2.1B for Owners use at a future time.

3.5 CLEAN-UP

- A. Upon completion of the swimming pool ceramic tile installation, thoroughly clean and polish the exposed surfaces of tile work. Completely clean work area of debris and rubbish occasioned by this Work and dispose of to the approval of the Owner's Representative.

END OF SECTION

SECTION 13 11 06 - SWIMMING POOL EQUIPMENT

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Swimming pool equipment items required for this Work as indicated on the Drawings and specified herein.

1.2 QUALITY ASSURANCE

- A. Qualifications of Workers:
 - 1. The entity performing the work of this Section shall have been successfully engaged in the respective trade for at least five (5) years immediately prior to commencement of the Work.
 - 2. For actual construction operations, use only trained and experienced workers with a minimum of three (3) years' experience with the materials and methods specified.
 - 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with a minimum of five (5) years' experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.
- B. All equipment supplied or work performed shall comply with regulations governing public swimming pools and spas as contained within Chapter 31 of California Building Code, latest edition.

1.3 SUBMITTALS AND SUBSTITUTIONS

- A. Provide submittals in conformance with the requirements of Section 01 33 00. Requests for substitution shall conform with requirements of Article 1.10.A of Section 13 11 00.
- B. Required submittals include:
 - 1. Swimming Pool Fittings as specified in Article 2.1 of this Section.
 - 2. Swimming Pool Deck and Mechanical Equipment as specified in Article 2.2 – 2.25 of this Section.
- C. Submit proof of qualifications as specified in Article 1.2.A of this Section.
- D. The equipment shown on the plans represent the first listed items in the technical specifications. The Contractor shall be responsible for all required field coordination and installation of any approved equal product to provide a fully working and warranted system. The Contractor shall submit detailed shop drawings for any products used other than the first listed specified items. Contractor provided shop drawings shall include details and quality equal to the original plans and construction documents. The Contractor shall provide any and all required engineering including but not limited to structural and anchorage requirements for any proposed equipment other than the first listed specified equipment. The Contractor is responsible to provide a factory certified representative(s) to start-up and provide on-site training for all swimming pool

mechanical equipment provided.

1.4 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect swimming pool equipment items before, during and after installation and to protect the installed work specified in other Sections.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner's Representative.

PART 2 - PRODUCTS

2.1 SAFETY EQUIPMENT

- A. First Aid Kit for 50 Persons with two (2) wool blankets: Marine Rescue or approved equal. Quantity as required by the Department of Health, One (1) minimum.
- B. Rescue Tubes (minimum 49" long) and Life Ring Buoy (minimum 24" in diameter), U.S. Coast Guard Approved: Marine Rescue, or approved equal. Quantity as required by the Department of Health, two (2) each minimum.
- C. Throw Rope (3/16" diameter) complete with lemon foot for use with Life Ring Buoy: Kiefer, United Industries, or approved equal. Three (3) required.
- D. Rescue Hooks, 16' long x 1-1/2" aluminum pole and stainless-steel mounting hardware: Kiefer, Pentair, or approved equal. Three (3) required.
- E. Pool Safety Signs: As required by the Department of Health. Submittal required. Placement at the pool site shall be in conformance with Health Department Inspector. Two (2) sets minimum.
- F. Spine Board: C.J. Penton Aquatics long board with "L" bracket head immobilizer with foam pads and Velcro strap, 4 Velcro body straps, or equal. Two (2) required

2.2 MAINTENANCE EQUIPMENT

- A. Commercial Pool Vacuum: Provide pool vacuum cart with a 155-square foot single-cartridge filter, lid-mounted handle, separate lid-mounted bracket for electrical cord, and two rubber-tired ball bearing wheels with grease fittings. Cart and filter shall be fabricated from schedule 304 stainless steel with welds treated and passified. Provide an all-bronze pump with a 1-1/2 hp, 115/230 volt, maximum 20 amp draw @ 120 volts, single phase motor and a 6" bronze trap. Pump shall be UL and NSF listed, have 2" suction and 1-1/2" discharge fittings, and have a brass priming valve with hose bib. Entire pump assembly shall be anchored to vacuum cart with two stainless steel bolts. Provide a 100-foot 10 AWG 3/C SJ electrical cord with ground fault interrupter (GFI) plus. Cord shall be wired to a double pole, 20-amp switch which shall be mounted on pump motor. One (1) required.
- B. Heavy Duty Vacuum Hose: 1-1/2" x 100' with hose connector. Pentair, Smooth Bore, or

- approved equal. One (1) required.
- C. Utility Pole: 24' fiberglass with connectors. Recreonics or approved equal. One (1) required.
- D. Commercial Vacuum Head: 24" wide "flexible" vacuum head. Pentair model #R201186 or approved equal. One (1) required.
- E. Pool Wall Brush: 36" wide professional quality. Pentair or approved equal. One (1) required.
- F. Leaf Skimmer: 30" x 8" x 12", professional quality. Recreonics, or approved equal. One (1) required.
- G. Water Quality Test Kit: #SP730 'Pool Test', 25 professional minilab kit complete, including PT 745 USB power supply, PT 746 USB computer cable, PT 265 alkaline batteries and PT 595/5 round test tubes, 10 mL, pack of 5.
- H. Pool Robotic Pool Cleaner: The automatic pool cleaner shall be Enduro – Turbo Clean XL50, one (1) required. Capable of operation via 120V, 220V in 50/60 Hz, or 24 VDC incoming power; 242 GPM or 14,530 gallons per hour. Utilize 20, 70, 105, 250 and 1,000 or 2,000 micron filter screens – all constructed of mesh.
1. Warranty: The robotic cleaner shall carry a 7-year anti-corrosion warranty on the stainless-steel frame from the date of product start-up. The cleaner shall carry a two-year warranty against all defects in material and workmanship, from date of product start-up, including all components in the system not including wearable items

2.3 FITTINGS

- A. Main Drain Frame & Grate: (18" x 54") and (18" x 36") Myrtha Main Drain Sumps with Lawson Aquatics main drain grates. Two (2) sets required. Provide four (4) Hayward #SP-105S 1-1/2" collector tubes and four (4) #SP-1056 1-1/2" hydrostatic relief valves #SP1055, one per main drain sump. **Contractor shall provide to the Owner a Certificate of Compliance, signed by a licensed design professional, for main drain sump(s) and frame(s) and grate(s), as required by the Virginia Graeme Baker Act and AB 1020.**
- B. Floor Return Inlet 1-1/2" Adjustable: to be provide as part of the Myrtha package. Eighty-eight (88) required.
- C. Swimming Pool Underwater Lights: 'Pure White LED' #LPL-F5W-120-00 (150' OR 200' cord) with polished stainless steel face rings, 87-watt lamps and J&J Electronics; Stainless Steel niches, Pentair #78210600 with 1" hubs, or approved equal. field coordinate cord lengths as necessary. Fifty-four (54) required.
- D. Junction Box for Underwater Lights, complete with strain reliefs: Hydrel #1719, Appleton, or approved equal. Twenty-seven (27) required.
- E. Hose Bibb: 'Woodford Mfg.' Model #B24 anti-siphon, vacuum breaker protected wall faucet. Furnish with model #B24BX-BR flush mounted wall box/door assembly. Brass finish. Seven (7) required.

2.4 DECK EQUIPMENT

- A. Starting Platform Anchors: KDI-Paragon 'Competitor' #23103DW, 6" deep, no known equal. Thirty-four (34) required. 'Competitor' #23074, cover for dual wedge, 'Competitor' #23303, cover removal tool.
- B. Starting Platforms: Track Start Competitor, Side Step #24527, no known equal. Eighteen (18) required.
- C. Stanchion Sockets: 1.90" I.D. Bronze. KDI-Paragon 38201TC, no known equal. Eighteen (18) required.
- D. Stanchion Posts: 1.90" O.D. x .145 wall. KDI-Paragon ten (10) #38106, and ten (10) #38301, no known equal.
- E. Lane Line Anchors: To be provided with Myrtha package. Ninety-one (91) required.
- F. Racing Lanes, 50 Meter disc to 2-75' lanes: Anti-wave Forerunner, Competitor or equal with lane line extensions. Colors to be selected by Owner. Eleven (11) required. Verify lengths and colors. Provide vinyl covered stainless steel lane line extensions, Knorr system model #EP-009-0020 or approved equal, two (2) per lane line. Provide two dedicated water polo lane lines with color markings with lane line extensions for 30 meter and 25 meter floating course including side goal tethers (eight total) and four (4) for 25 yard stationary courses.
- G. Racing Lane Reel with Cover: KDI-Paragon #75101SS, with cover #75133, no known equal. Six (6) required.
- H. Moveable 6 Ft. Lifeguard Chair: KDI-Paragon #20302, no known equal. Three (3) required.
- I. Cross-Braces Ladder: Paragon #42111, 1.90" O.D. x .145" wall, no known equal. Three (3) required.
- J. Handrail: KDI-Paragon #34203, 3 bend, 1.90" O.D. x .145" wall. Six (6) required.
- K. Long Reach Adjustable Grabrail: KDI-Paragon # 30320 1.90" O.D. x .145", no known equal. Size (6) required.
- L. Anchor Sockets for Grab Rails, Hand Rails and Ladders: KDI-Paragon 28102, no known equal. Forty-two (42) required.
- M. Stainless Steel Escutcheon Plates for Grab Rails, Hand Rails & Ladders: Spectrum model #35214, no known equal. Forty-two (42) required.
- N. Stationary Water Polo Goals: KDI-Paragon #36104, no known equal. Furnish complete with anchors and nets, #36201. Two (2) pair required.
- O. Floating Water Polo Goals: 'Antiwave' #AW0550 or equal. One (1) pair complete with nets and tethers.
- P. Access Lift: Spectrum Traveler XRC500 or approved equal. Furnish with anchors, #27365 lift cover, #26060 transporter cart and #13257 extra battery pack; two (2) required.

- Q. Backstroke and Recall Pennants: 'Champion' 3/16" diameter vinyl coated cable #50-175; 'Champion' hardware package #53-030, and 'Champion' 12" x 18" vinyl coated polyester pennants #53-020 Lincoln Equipment, Knorr Systems, or equal.
- R. 1 Meter Diving Stand: Arcadia Air Products 'Durafirm' #70-231-400, no known equal. Furnish complete with double rails, anchors, and mounting hardware. Two (2) required.
- S. 16' Diving Board: Arcadia Air Products 'Maxiflex B' #66-231-330, no known equal. Furnish complete with jury rig poles. Two (2) required.
- T. Pool Cover System (T-Star or equal): A pool cover system specified herein will be provided and shall include all of the listed features, without exception. Submittal data must include complete documentation relating to all the specified features and include manufacturer's sales literature, specification sheets, and installation/operation/ maintenance manuals. Upon written request from the owner or specifying agent, bidder shall provide the following samples for review: cross sections of tubing used for storage reel winding tubes and end frames; a winding tube bearing; a castor wheel assembly; a brake assembly and a cover sample measuring at least 8 inch x 11 inch, including weighted side edge, reinforced end edge, and grommet.

1. Cover Material:

- a. Material shall be woven, 12 by 10 count per inch, high-density polyethylene, ultraviolet stabilized film fabric, laminated to both sides of 1/8 inch thick, closed cell, medium density, white, polyethylene foam. The woven polyethylene film fabric shall be coated on both sides with an ultraviolet stabilized, chemically resistant polyethylene coating. The combination of film, foam and woven components shall be non-toxic, non-absorbent, non-permeable and buoyant. Color shall be blue on upper surface and black on under surface. In addition to the above, cover must meet the following requirements:

2. Laminate Physical Properties:

Tensile strength (Grab Breaking Strength)	ASTM-D 5034: 371 lbs.
Tongue tear resistance	ASTM-D 2261: 87 lbs.
Mullen burst strength	ASTM-D 751: 500 psi
Pull Strength	1,260 psi
Seam tear resistance	85 lbs.
Insulating ("K") value	ASTM-D 2326: 0.25 BTU/(Sq.Ft.)(Hr)(°F/Inch)
Flammability (ASTM-E 84)	0 spread rating
Abrasion resistance	0.00466 gram/1,00 cycles (ASTM-D 3389)
Laminate maintains minimum 99" foam-fabric adhesion and maximum 1 1/4% overall shrinkage after 15 minute boil test.	
Laminate is non-permeable due to closed cell fola, LDPE coating and flame lamination	
Service temperature range	40° to + 160°F.
Chemical resistance is excellent due to polyethylene-based material	
Thickness after lamination process	120" (+ 0.6")

3. XER Physical Properties:

- a. Proprietary Ethylene Interpolymer Alloy (EIA) with polyester scrim fabric, type 8130.
- b. Weight: 30 oz/yd² Nominal.
- c. Thickness: 30 mils minimum.
- d. Color: carbon black (for maximum UV resistance).
- e. Tensile (Grab Breaking Strength) strength: 550 lbs. minimum (ASTM – D 751)
- f. Burst strength: 650 lbs. min (ASTM – D 751).

- g. Abrasion resistance: 0.050 mg/1,000 cycles weight loss (ASTM-D 3389 H-18 wheel 1 kg load).
 - h. Puncture resistance: 259 lbs. min. (ASTM-D 4833).
 - i. UV resistant: excellent
4. Cover Construction:
- a. Laminated materials shall be sewn together by using double needle, lockstitch machine with size 138 bonded, yarn-dyed black, UV resistant, polyester thread. The first and last sections of each cover shall be subjected to two (2) passes under the sewing machine, resulting in four (4) sewn seams. To prevent wind lift, the proprietary weighted vinyl straps material shall be encapsulated with four (4) layers of 12 x 10 woven PE fabrics and shall be sewn along the lateral edges of each cover. Water shall be allowed to fill into and drain out of the hollow encapsulated weighted edging via 3/16" diameter perforations at 18" intervals for additional stabilization. The Black XER fabric shall be sewn laterally and parallel with the tensile pull direction at both ends of the cover panel, 12" x 18" wide, as a means of reinforcement on the heavily stressed areas in the center of the panels. Corners shall be strengthened by folding (doubling) the fabric material. Each 'pull-point' location shall be reinforced with six (6) layers of 12 x 10 woven PE fabric, non-corrosive stainless steel grommets and 1/8" thick T-1 PVC load-dispersing plate. Solid 3/4" diameter white Ultra High Molecular Weight polyethylene (UHMW-PE) dowel coupled with 1/4" solid braided white polyester cord shall be securely tied to the 'pull-point' of the cover for easy cover retrieval. Ladder and rail cut-outs, hinges and rounded corners are incorporated into the cover. Precautions shall be taken by rounding and reinforcing cut-out corners to prevent stress tears.
 - b. ASTM approved safety /warning labels shall be securely attached to each completed pool cover. And in accordance with ASTM standards, safety/warning labels are positioned in such a way that they are visible from and around the pool deck.
 - c. Cover panels shall totally cover the surface of the pool without gaps or overlaps with reinforced cutouts to accommodate rounded, step areas, rails, etc. Cover panels shall be of the following quantities and sizes:

Qty.	Size
1	Stair section approx. 17" x 94'-3"
9	15 feet, 8 inch x 75 feet 1 inch

5. Storage Reels:

- a. The following quantity, model, and size of storage reels shall be provided:

Qty.	Winding Tubes Per Reel	Length of Winding Tubes
3	3	16 Foot
1	1	18 Foot

- b. Storage reel frame, winding tubes, castors, brake shafts, cranks and fasteners shall be made of type 304 stainless steel. Each reel shall have six wheels, each of which shall be 6 inches in diameter, be rated at 1200 pounds load capacity and be made of solid polyurethane. Wheels shall be self-lubricating and have steel axle shafts and stainless steel swivel yoke assemblies. The reel shall have two frame-mounted, screw-type brakes with pads that lock directly to the pool deck and have a total of 18 square inches of total braking surface. Castor brakes or other types of foot-operated or lever-operated brakes will not be considered equal. Each winding tube

shall be 4-1/2 inches in diameter; have a wall thickness of .120 inches; and shall consist of a continuous length of tubing without joints or welds. Shaft assembly shall be mounted to the 4 1/2 inch reel tube with a minimum of three (3) stainless steel hit rivets per end. Welded ends will not be accepted. Reels with tubes fabricated from two or more pieces of tubing joined together will not be acceptable. End frames shall be fabricated from 1-1/2 inch square Schedule 304 stainless steel box beam tubing with .120 inch wall thickness. Round tubing will not be accepted. To facilitate field repair, 3/8 inch stainless steel bolts, nuts and washers shall be used to connect major reel frame parts, wheels, brakes, bearings and winding tubes. Reels that use welding to connect these components will not be considered equal. Winding tube bearings shall be self-aligning, self-lubricating and have a capacity of 1245 pounds at 10 revolutions per minute. Bearing housing shall be a non-oxidizing composite material. Winding tube bearing material containing metals will not be considered and equal.

- c. Storage reels: Plans for use of storage reel to be submitted for approval by the Architect, and must include a configuration that assigns one pool cover panel per storage reel winding tube with the maximum allowable length of the panel to be indicated in the submittal, along with the amount of reels to be used in storing covers, the number of tubes per storage reel, the length of each tube, the amount and drawing(s) showing location of tabs on each tube, and the number and sequence of covers to be stored.
 - d. Each storage reel shall be provided with a protective cover constructed of vinyl-laminated polyester cloth, 1000 denier, totaling 13 ounces per square yard.
6. Delivery:
- a. The entire cover system shall be delivered to pool site within 4 weeks of date of purchase order. Failure to meet this requirement will result in a \$100 per day penalty fee being assessed and deducted from the contract price.
7. Measurement, Installation and Training:
- a. A representative of the manufacturer shall visit each pool site to confirm measurements prior to ordering, and, once cover is delivered, train personnel and supervise initial installation of covers.
8. Warranty:
- a. Covers shall have six (6) year (first 3 year full and last 3 year pro-rated) written manufacturer's limited warranty against defective materials and workmanship. Warranty period shall begin with the date of customer's acceptance of the completed, installed and functioning pool covers.

2.5 COMPETITION POOL STRAINER

- A. Evoqua 'Pro-Strainer' stainless steel reducing strainers: #PSV1214SC-C and #PSV0604SC-C, each with two (2) stainless steel strainer baskets.

2.6 COMPETITION POOL CIRCULATION PUMP

- A. 'Paco' counter-clockwise KPV #1012-1/2 10" x 12" x 12"; Type 'KPV' vertical split case pump; 1187 RPM; 460V 3PH; 50HP; rated at 2200 GPM @ 60 ft. T.D.H.; 77.73% efficient; premium efficiency TEFC motor; epoxy coat all wet surfaces. 'Paco', 'Aurora' or equal. (2000 lbs.). Provide 'SPCS' smart pump control system variable speed drive model SPCS050EF4 System 20 20.7" x 49" x 16.8" deep. Coordinate mounting location to maintain desired clearances, 460V 3PH.

2.7 COMPETITION POOL FILTER

- A. 'EKO³ Systems Gen 2' #EKO-42300-1206-T5 automatic filter control (AFC) fully automatic hi-rate permanent media filter with 150 sq. ft. of filter area rated at 2250 GPM at 15 GPM/sq. ft. Complete with 14" face piping, 6" backwash, seismic anchorage. Provide all utilities, piping, valving etc. (9475 each tank) 'EKO³ Systems Gen 2' or equal. Provide Signet MK-515 flosensor with digital readout. One (1) system total.

2.8 COMPETITION POOL HEATER

- A. Indirect fired pool heating package system: 'Aquas' Crest smart touch control condensing modulating boiler, titanium heat exchanger with CPVC connections, factory assembled skid mounted package, California Code Controls, 1 1/2" natural gas connection, 3" water connections and 8" diameter air inlet and 8" diameter vent size, PVC vented; 1,500,000 BTU per hour input, 97% efficient. Provide 3/4" cold water connection 'Lochinvar' APO1500N, weight = 3097 lbs. each. Three (3) total.

2.9 LEARNING POOL CIRCULATION PUMP

- A. 'Paco' #30127, 3" x 4" x 12.10"; Type 'LC' end suction centrifugal pump, 1173 RPM; 460V 3PH; 7.5HP; rated at 250 GPM @ 60 ft. T.D.H.; 73.5% efficient; premium efficiency TEFC motor; epoxy coat all wet surfaces. 'Paco', 'Aurora' or equal. (2000 lbs.). Provide 'SPCS' smart pump control system variable speed drive model SPCS007EF4 System 14.8" x 35" x 13.9" deep. Coordinate mounting location to maintain desired clearances, 460V 3PH.

2.10 LEARNING POOL FILTER

- A. 'EKO³ Systems Gen 2' #EKO-34175-0606-T1 automatic filter control (AFC) fully automatic hi-rate permanent media filter with 17.5 sq. ft. of filter area rated at 350 GPM at 15 GPM/sq. ft. Complete with 6" face piping, 6" backwash, seismic anchorage. Provide all utilities, piping, valving etc. (4405 each tank) 'EKO³ Systems Gen 2' or equal. Provide Signet MK-515 flosensor with digital readout. One (1) system total.

2.11 LEARNING POOL HEATER

- A. Indirect fired pool heating package system: 'Aquas' Crest smart touch control condensing modulating boiler, titanium heat exchanger with CPVC connections, factory assembled skid mounted package, California Code Controls, 1.25" natural gas connection, 3" water connections and 6" diameter air inlet and 6" diameter vent size, PVC vented; 999,000 BTU per hour input, 97% efficient. Provide 3/4" cold water connection 'Lochinvar' APO1000N, weight = 2659 lbs. each. One (1) total.

2.12 WATER CHEMISTRY CONTROLLER

- A. Provide Ethernet connection to each controller. 'Becsys' BecSys7 water chemistry controller. Provide complete system control package. BecSys System 7, Impact, Wallace & Tiernan or approved equal. Two (2) total.

2.13 CARBON DIOXIDE STORAGE/FEED SYSTEM

- A. 'Taylor Wharton', 750 lb. cryogenic liquid CO₂ storage tank with remote fill port, electric tank heater with seismic restraints and remote fill ports (operating weight = 594 liquid lbs. each) Provide EKO PH-MTS CO₂ high efficiency feed system with alkalinity control, 0 to 160 SCFH feed capacity booster pump, piping injector, flowmeter, relays and acid feed alkalinity control. Two (2) feed systems required. Provide within mechanical room hard wired 'Analog' #API KIT CO₂ detector with audible and visual alarms and sensors in each chemical room and mechanical room, UL 1971 Standard Listed. One (1) total.

2.14 CHLORINE STORAGE/FEED SYSTEM(S)

- A. Provide 'Chem-Tainer' 1000 gallon #TC7485DC; dual storage/containment tank with lid seismically restrained. Operating weight = 8330lbs. Complies with Fed. Reg. 40CFR-264-163. Feed pump shall be 'LMI' #SD43-88P-KSI, 288 GPD at 150 PSI with FRP shelf brackets. Hard pipe to point of injection.

2.15 ACID STORAGE/FEED SYSTEM(S)

- A. Provide 'Chem-Tainer' 350 gallon #TC5256DC; dual storage containment tank with lid seismically restrained, (2920 lbs.). Complies with Fed. Reg. #40CFR-264-163. Provide a complete vapor recovery system. One (1) total.

2.16 BACKWASH TANK

- A. 3'-0" x 10'-0" x 11'-0" high concrete tank with access ladder rings AMD 4"ø drain with P trap outlet to sewer. Provide waterproofing per specifications. Coordinate with structural and plumbing plans.

2.17 COMPETITION POOL AND LEARNING POOL FILL SYSTEM(S)

- A. 3" Cla-Val fill system to include 3" Cla-Val solenoid control valve #136-01BY, 3" duct iron, epoxy coated body with cast iron disc retainer and diaphragm washer, bronze trim, flanged globe pattern, 120V at 60 Hz. Solenoid wiring shall be wired to water chemistry controller. Provide 6" air gap at fill point. Two (2) total.

2.18 EYEWASH / SHOWER

- A. Haws Model #8309 WC Barrier free combination eyewash/shower and eye/face wash with corrosion resistant protection. See MEP sheets for water supply piping. Two (2) total.

2.19 POOL OPERATORS' WORKSTATION DESK

- A. 'Total Lab Solutions' epoxy countertop with drop-in sink and two (2) end cabinets. Furnish with wall mounted two (2) faucets 'Broen Boss' or approved equal. See MEP plans for water supply piping.

2.20 COMPETITION POOL COOLING FANS

- A. 'Glacier Pools' GPC280, 2HP, 208V, 7.5 amp, 3PH w/ 4" pipe connections. Two (2) totals. (750 lbs.)

2.21 COMPETITION POOL COOLING BOOSTER PUMP

- A. 'Pentair' C-Series, CMK-50, 5HP, 208V, 3PH, self priming pump, 3450 RPM rated at 400 GPM at 30 ft. TDH, with integral strainer. One (1) total.

2.22 LEARNING POOL COOLING FAN

- A. 'Glacier Pools' GPC230, 1HP, 208V, 4.6-amp w/ 2.5" pipe connections. One (1) total. (300 lbs.)

2.23 LEARNING POOL COOLING BOOSTER PUMP

- A. 'Pentair' Whisperflo WFK-4, 1HP, 208V, 3PH, self-priming pump, 3450 RPM rated at 100 GPM at 30 ft. TDH, with integral strainer. One (1) total. (346 lbs.)

2.24 SUMP PUMP

- A. 'SW' Series, 1/3 HP, 115V, 10 amp, with float switch and 2" pipe and check valve into backwash tank. One (1) total.

2.25 PUMP PIT

- A. 13'-0" x 15'-0" x 8'-0" deep. Provide 2" \varnothing galv. Standard steel pipe guardrail. Provide sump pump to waste. Provide waterproofing per section 131110. Access ladder to be 'Karnel' custom stainless steel with gray epoxy paint.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
 1. Prior to installing the items of this Section, carefully inspect the installed Work of other trades and verify that all such Work is complete to the point where this installation may properly commence.
 2. Verify that the swimming pool equipment items may be installed in strict accordance with original design, pertinent codes and regulations, and the manufacturers' recommendations.
- B. Discrepancies:
 1. In the event of discrepancy, immediately notify the Owner's Representative.

2. Do not proceed with installation in areas of discrepancy until all such discrepancies are fully resolved.
3. Failure to notify the Owner's Representative and give written notice of discrepancies shall constitute acceptance by the Installer of existing conditions as fit and proper to receive its Work.

3.2 INSTALLATION

- A. Supply and install items of swimming pool equipment in strict accordance with applicable codes and regulations, the original design, and the manufacturer's published recommendations, anchoring firmly and securely for long life under hard use.
- B. Coordinate with other trades to insure all imbedded items are set plumb and flush. Railing ends must have anchor sockets and escutcheon plates. Be certain that deck equipment and railings are properly bonded prior to imbedding.
- C. All equipment shall be braced and/or anchored to resist horizontal force acting in any direction using the criteria shown on the Drawings.

3.3 INSTRUCTION

- A. The Contractor shall provide a factory certified representative(s) to start-up and certify proper installation, operation and full warranty status of all swimming pool mechanical equipment. The Contractor shall provide not less than two 8-hour days of on-site training for facility staff in the operation and maintenance of the swimming pool mechanical equipment and systems. The two 8-hour days shall be separated by a minimum of seven calendar days and be completed within the 14-day start-up period.

3.4 EQUIPMENT ACTIVATION

- A. All water chemistry and filtration mechanical equipment shall be operational upon filling of pool after plaster. Chemicals and other related support items as supplied by Contractor, shall be in supply at start-up.
- B. For the first fourteen (14) calendar days after completion of the pool plaster, brush all plastered surfaces at least twice a day and coordinate with General Contractor to ensure that the plaster is carefully maintained after the initial fourteen day period. In addition, coordinate with the Contractor to ensure that pool filtration equipment is continuously running during the initial fourteen day period.
- C. Start-up and provide qualified personnel to operate pool equipment for a period not less than fourteen (14) days after the pool is placed in operation, or until the Owner takes occupancy of the facility or letter of substantial completion. During this time, Contractor shall instruct and supervise the Owner's personnel in the various operating and maintenance techniques involved. Contractor shall be responsible for supply of chemicals during this not less than fourteen (14) day period and at time of turnover to Owner, chemical storage tanks shall be full. (Owner's personnel shall be fully trained and capable of assuming swimming pool maintenance tasks, training may begin before Owner takes occupancy).

3.5 CLEAN-UP

- A. Upon completion of swimming pool equipment, remove all debris, materials and equipment occasioned by this Work to the approval of the Owner's Representative.

END OF SECTION

SECTION 13 11 07 - SWIMMING POOL MECHANICAL

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Swimming pool mechanical piping as indicated on the Drawings for circulation and filtration systems, pool water heating systems, chemical control systems, booster pump systems and appurtenances.
- B. Domestic water system from points of connection within swimming pool mechanical equipment room to make-up water system.
- C. Filter backwash piping to point of connection with backwash retention pit as required.

1.2 QUALITY ASSURANCE

- A. Qualifications of Workers:
 - 1. The entity performing the work of this Section shall have been successfully engaged in the respective trade for at least five (5) years immediately prior to commencement of the Work.
 - 2. For actual construction operations, use only trained and experienced workers with a minimum of three (3) years experience with the materials and methods specified.
 - 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with a minimum of five (5) years experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.
- B. Standards:
 - 1. All equipment supplied or work performed shall comply with Chapter 31 of California Building Code, latest edition.
 - 2. Work shall be performed in accordance with the applicable editions of all National, State and local codes, laws, regulations and ordinances, including the following:
 - a. American National Standards Institute (ANSI).
 - b. American Society for Testing Materials (ASTM).
 - c. American Waterworks Association (AWWA).
 - d. American Welding Society (AWS).
 - 3. Do not construe anything in the Drawings or Specifications to permit Work not conforming to these requirements.

1.3 SUBMITTALS AND SUBSTITUTIONS

- A. Provide submittals in conformance with the requirements of Section 01 33 30. Requests for substitutions shall conform with requirements of Article 1.10.A of Section 13 11 00.
- B. Required submittals include:
 - 1. Pipe and Fittings as specified in Article 2.2 of this Section.

2. Valves as specified in Article 2.3 of this Section.
3. Pressure / Vacuum Gauges as specified in Article 2.4 of this Section.
4. Pipe Hangers and Supports as specified in Article 2.5 of this Section.
5. Sleeves and Waterstops as specified in Article 2.6 of this Section.

C. Submit proof of qualifications as specified in Article 1.2.A of this Section.

1.4 PRODUCT HANDLING

- A. Delivery: Deliver all materials to the Project Site in the manufacturer's original unopened containers with all labels intact and legible.
- B. Storage: Store all materials under cover in a manner to prevent damage and contamination, and store only the specified materials at the Project site.
- C. Protection: Use all means necessary to protect swimming pool mechanical items before, during and after installation and to protect the installed Work specified in other Sections.
- D. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner's Representative and at no additional cost to the Owner.

1.5 JOB CONDITIONS

- A. Cooperate with entities performing Work specified in other Sections to so that no conflict of new construction or occupied space may occur. Should any installation Work be done without such craft coordination, that Work so installed shall be removed and re-installed.

PART 2 - PRODUCTS

2.1 PRODUCT QUALITY

- A. Materials and equipment shall be new, of the best quality for the purpose intended, and shall be clearly marked with the manufacturer's name and nameplate data or stamp and rating. As far as practicable, materials and equipment shall be of one manufacturer.

2.2 PIPE AND FITTINGS

- A. PVC Schedule 40: Type 1, normal impact, NSF approved for solvent welding applications, ASTM Specification D-1785, color shall be white. Dura, Lasco, or approved equal.
- B. PVC Schedule 80: Type 1, normal impact, NSF approved for solvent welding applications, ASTM Specification D-1785, color shall be gray. Dura, Lasco, or approved equal.
- C. CPVC Schedule 80 Influent/Effluent Heater Piping: Type 1, normal impact, NSF approved for solvent welding applications, ASTM Specification D-1785, color shall be gray. Dura, Lasco, or approved equal.

- D. PVC DR25: Conforming to ATSM D-1784, use with epoxy coated bell and spigot-type fittings or epoxy coated mechanical joint by flange adapters with epoxy coated cast iron fittings as specified in Article 2.2 (F), below. Johns-Manville "Big Blue", Diamond Plastics, or approved equal.
- E. Copper Tubing: ASTM Specification B-88, hard drawn, with ANSI Standard B16.22 wrought copper fittings.
- F. Steel: ASTM Specification A-120, Schedule 40 black or galvanized pipe with ASTM A-47 150 lb. banded malleable iron threaded fittings.
- G. Cast Iron: ASTM Specification B16.1, cast iron flanged fittings, provide epoxy coating as required for use with chlorinated water.

2.3 VALVES

- A. Ball Valves:
 1. For pool system: True-Union design, PTFE seat material with FPM or FKM Double O-ring stem seals, locking handle, NSF certified. PVC schedule 80 body for below grade installation. CPVC Schedule 80 body for above grade installation. Furnish ball valves on all pip diameters 2 ½" or less with a rating of at least 200psi at 73° F, Asahi Pool-Pro , Iplex or Nibco
 2. For copper pipe system: 3-piece full-port Bronze body valve with Teflon seat, 'Apollo', 'Nibco' or approved equal
- B. Butterfly Valves:
 1. Epoxy coated cast or ductile iron body, 316 stainless steel disc and stem, viton seat material, furnish hand wheel/gear operators on all valves 8" and larger. DeZurick, Keystone, Iplex or equal.
 2. PVC body, PVC disc and EPDM construction suitable for chlorinated water applications. Stem shall be of 316 stainless steel and non-wetted. Valves shall be self-gasketed design with a convex sealing arrangement. Valves 1-1/2" – 10" shall be rated to 150 psi and 12" valves shall be rated to 100 psi at 70°F. Asahi Pool-Pro, no known equal.
- C. Check Valves: Wafer-type, epoxy coated cast or ductile iron body, 316 stainless steel plates and shaft, viton seat material. Centerline, Metraflex, or approved equal.
- D. Surge Chamber Float Valve(s): EPD #2-0020-044 Float Control Valve, 12" line size, as manufactured by Environmental Products Division of Doughboy Recreational, Rancho Cucamonga, CA, no known equal. Two (2) total.
- E. Surge Chamber Isolation Valve: Butterfly valve, tapped lug style, bronze body, stainless steel stem, bronze disc, phenolic back-up ring, EPT seat material. Provide stainless steel shaft extension, shaft housing and tool operator located 2'-0" above floor level with deck access grate as required. DeZurick, Keystone, Asahi, Spears, Iplex or approved equal.
- F. RP Backflow Preventer: Febco #835-B for 2" and smaller; #825 for 2-1/2" and larger. Febco, Watts, or approved equal.
- G. Make-up Water Control: Cla-Val make-up water control valve with ductile iron body/cover,

bronze trim, globe pattern, Buna-N rubber seals. Pilot system materials to consist of bronze/brass with stainless steel wetted parts and Buna-N rubber seals.

System to include: 100-01 Hytrol valve, CF1-C1KX float control, X46A flow clean strainers, and copper tubing with brass fittings. Float linkage and float rod shall be PVC and brass. Base plate shall be 316 stainless steel. The plastic float shall be provided with 8' PVC rod and stops and a brass counter weight. Provide model #124-01AKX available KSI (714) 754-044.

2.4 PRESSURE / VACUUM GAUGES

- A. Furnish and install pressure and vacuum gauges on the discharge and suction sides of all pumps. 2" or 2 1/2" diameter dial, bottom connection, chrome ring, shut-off cock and snubber. Ranges shall be selected to indicate between mid-point and two-thirds of maximum range under design conditions. Marsh, Terrice, or approved equal.

2.5 PIPE HANGERS AND SUPPORTS

- A. General:
 - 1. The requirements of this Section relates to various requirements of the Agreement, General and Supplementary Conditions, Specifications, Drawings, and modifying documents which are part of the Construction Contract. Responsibility for coordination of all such applicable requirements will be that of the Contractor.
- B. Description:
 - 1. This section provides guidelines and limitations for the support of all mechanical, electrical, plumbing or architectural items from the building structure, and for the seismic bracing of such items.
 - 2. Install all support and bracing systems per drawings and details as required for the swimming pool systems. Attach to portions of the building structure as indicated on the drawings.
- C. Quality Assurance:
 - 1. Design and install all support systems to comply with the requirements of the 2019 California Building Code, Chapter 16A.
 - 2. Seismic bracing is to be designed by a professional engineer licensed in the State of California.
 - 3. For the seismic bracing of mechanical, electrical and plumbing system, refer to OPM Design #0043-13.
- D. Submittals:
 - 1. Submit shop drawings for all substructures and attachment methods.
 - 2. Submit proposed alternative methods of attachment for review and approval by the Architects, prior to deviating from the requirements given below.
 - 3. For all pipe hangers and support systems, submit structural calculations and details which include all resultant forces applied to the building structure and are prepared and signed by the Contractor's licensed California professional engineer. Calculations will be reviewed for compliance with design criteria, not for arithmetic.
- E. Materials:
 - 1. Use Kin-Line, Grinnel, or approved equal.

2. Support all pipelines individually with hangers, each branch having at least one hanger. Lateral brace as noted and required.
3. Support piping near floor with steel stanchions welded to end plates secured to pipe and floor.
4. Support vertical piping at each floor level. Install coupling in piping at each support. Coupling shall rest on and transmit load to support. Isolate copper from steel supports with vinyl electrician's tape around pipe and coupling.
5. Use Stoneman "Trisolator," Unistrut, or approved equal, isolators at each hanger and other support points on bare copper tubing system.
6. For PVC pipe, space hangers four (4) feet apart for pipe sizes 1" and under, five (5) feet apart for pipe sizes 1-1/4" to 2", and six (6) feet apart for pipe sizes over 2". Space hangers for horizontal pipes at a maximum of six (6) feet for copper 2" and smaller and for steel 1-1/4" and smaller; ten (10) feet for copper 2-1/2" and larger and for steel 1-1/2" and larger.
7. Size hanger rods, screws, bolts, nuts, etc., according to manufacturer's sizing charts.
8. Trapeze hangers may be used for parallel lines.
9. Use galvanized or cadmium plated hangers, attachments, rods, nuts, bolts, and other accessories in pool mechanical room, high humidity areas, or where exposed to weather. Hot dip galvanize all items which are not factory furnished. Plating for hinged movements must be done at the factory.
10. Lateral Bracing: To prevent swaying of the piping systems, provide angle iron bracing and anchor into wall or overhead framing. Piping shall be braced or anchored in such a way as to resist a horizontal force of 50% of its operating weight in any direction.
11. Do not use wire or other makeshift devices for hangers.
12. Furnish all substructures and fasteners required to comply with the limitations given below. Use material as specified in the various sections and as appropriate to their use.

F. Guidelines & Limitations:

1. Each Contractor will coordinate the load requirements from all subcontractors so that no combination of loads overstresses the building structure or exceed the limitations given below.
2. Steel Structure:
 - a. Hang no more than 20 pounds per metal deck rib in any span.
 - b. At beams, hang all beam loads greater than 40 pounds concentric to beam, not off the flanges.
 - c. Attached no loads to the beams or girders greater than the following without specific approval from the architect;
 - 1) Roof beams and girders: 300 pound point load or 600 pound total load for a single span.

G. Seismic Bracing:

1. Design and install seismic bracing to not ground out vibration and sound isolation systems.
2. All items of mechanical and electrical equipment 60" or more in height are to be seismically braced whether such bracing is shown or not.

2.6 SLEEVES AND WATERSTOPS

- A. Provide sleeves where work of this Section passes through fire rated partitions, floors and ceilings, concrete slabs or exterior of structure. Caulk clearance space using sealant appropriate

for application in conformance with manufacturer's recommendations and Title 24 of California Code of Regulations. 3m, Dow Corning, or approved equal. In lieu of sleeves and caulking, "Link Seal" products may be used.

- B. Provide prefabricated waterstops as indicated on the Drawings at all pipe penetrations through structures containing stored water (i.e., swimming pools, balance/surge tanks, etc.) to insure leak-proof seals.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
 - 1. Prior to Work of this Section, carefully inspect the installed Work of other trades and verify that such work is complete to the point where this installation may properly commence.
 - 2. Verify that items of this Section may be installed in accordance with the original design and referenced standards.
- B. Discrepancies:
 - 1. In the event of discrepancy, immediately notify the Owner's Representative.
 - 2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
 - 3. Failure to notify the Owner's Representative and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive his work.

3.2 ABBREVIATIONS AND SYMBOLS

- A. Abbreviations and symbols on the Drawings are those most commonly used. Obtain clarification from the Owner's Representative on any questionable items before bid.

3.3 GENERAL PIPING REQUIREMENTS

- A. Size any section of pipe for which size is not indicated or any intermediate section erroneously shown undersized the same size as the largest pipe connecting to it. Sizes listed are nominal.
- B. Cut pipe accurately to job measurements and install without springing or forcing, true to line and grade, generally square with building and/or structures and adequately supported to prevent undue stress on pipe, fittings and accessories.
- C. Make changes of direction with manufactured fittings. Street ells, bushings, reducing flanges, close nipples or bending of pipe is not allowed.
- D. Use great care to install piping in accordance with best practice. Plastic pipe shall be "snaked" in trenches to allow for thermal expansion.
- E. All above grade, below grade and buried or imbedded PVC shall be installed using solvent

weld fittings. Also, each and every fitting and pipe end shall be prepared with solvent primer. Fittings shall be joined individually and with enough time between assembly of adjacent joints to allow them to seal solidly. After joining, an even ring of primer must be visible around the entire fitting. If any fittings are installed without visible primer, the fitting shall be removed and discarded and piping recut, rechamfered and joint made up again using a new fitting. All procedures, methods and techniques used to make up solvent weld joints shall be in strict accordance with manufacturer's recommendations.

- F. Arrange pipe and hangers to allow for expansion, contraction and structural settlement. No pipe shall contact structure except penetrations as shown on the Drawings.
- G. Provide dielectric connections between copper and dissimilar metals. In copper systems, threaded piping including connections to equipment shall be brass pipe and fittings. Install dielectric connections in vertical sections of piping only.
- H. Run pipe full size through shut-off valves, balancing valves, etc. Change pipe size within three (3) pipe diameters of final connection to control valves, fixtures and other equipment.
- I. Provide unions or flanges at connections to equipment, on service side of valves and elsewhere as required to facilitate ease of maintenance.
- J. Locate equipment shut-off valves as close to equipment as possible maintaining easy valve access.
- K. Make all connections between domestic water systems and equipment or face piping with approved backflow prevention devices as required.
- L. All PVC pipe exposed to direct sunlight shall be painted with two coats of Exterior Acrylic Semi-Gloss Paint, Sherwin Williams or equal. Color to be selected by the Architect. Prior to painting the PVC pipes, the exterior of all PVC pipes shall be wiped with Methyl Ethyl Ketone, or an approved equal, to remove the glaze from the pipes.
- M. The Main Drain pipe must run either level or uphill from the main drain sump, through the surge pit (if applicable) and then to the circulation pump.

3.4 TRENCH EXCAVATION AND BACKFILL

- A. Excavation:
 - 1. Excavate and backfill trenches as required for the Work of this Section. Conform to requirements of Section 13 11 01.
 - 2. The Contractor shall perform all excavation of every description and of whatever materials encountered, to the depths indicated on the Drawings or as necessary. The Contractor shall dispose of the excavated materials not required or suitable for backfill as directed and shall perform such grading as may be necessary to prevent surface water from flowing into the trenches. The Contractor shall provide adequate equipment for the removal of storm or subsurface waters, which may accumulate in the excavated areas.
- B. Trenching:
 - 1. Excavate trenches to lines and grades as indicated on the Drawings and with banks as nearly vertical as practicable.
 - 2. Bottoms of trenches shall be accurately graded to provide uniform bearing on undisturbed

- soil for the entire length of each section of pipe.
3. The width of the trench at and below the top of the pipe shall be such that the clear space between the barrel of the pipe and the trench wall shall not exceed 8" on either side of the pipe. The width of trench above the top of pipe may be wider if necessary.
 4. Over-depth excavations shall be filled with tamped sand to required grades.
 5. Excavations of five (5) feet or more in depth shall be shored or supported in conformance with rules, and regulations of State and Federal Governments. Shoring shall be constructed, maintained and removed in a manner to prevent caving of the excavation walls or other load on the pipe.
- C. Backfilling:
1. Material for backfilling of pipes shall be approved granular material less than two (2) inches in diameter obtained from the excavation. No material of a perishable, spongy or otherwise unsuitable nature shall be used as backfill.
 2. Backfilling of pipe trenches shall commence immediately after installation and testing to preclude damage to the installed pipe. Backfill around pipe shall be carefully placed so as not to displace or damage the pipe and shall be carried up symmetrically on each side of the pipe to one foot above the top of the pipe. The material shall be carefully compacted or consolidated before additional backfill is placed.
 3. Backfill above an elevation of one foot above the top of pipe in conformance with requirements of Section 13151. Material for balance of backfill shall be approved granular material less than six (6) inches in diameter taken from the excavation.
 4. Unless otherwise indicated on the Drawings, all pipe shall have a minimum of eighteen (18) inches of cover.

3.5 GENERAL EQUIPMENT REQUIREMENTS

- A. Position equipment to result in good appearance and easy access to all components for maintenance and repairs.
- B. Install piping, flues, breeching and ducts so that they do not interfere with equipment access.
- C. Install level, secure and out of moisture. Provide shims, anchors, support straps, angles, grouted bases, or other items as required to accomplish proper installation.
- D. All screws, nuts, bolts and washers shall be galvanized, cadmium plated or stainless steel. After fabrication, hot-dip galvanize unfinished ferrous items for outdoor, below grade or other use subject to moisture.
- E. Extend 1/2" Schedule 40 black steel pipe lubrication tubes from all hard to reach locations to front of equipment or to access points. Terminate with proper type of lubrication fitting.

3.6 VALVES AND STRAINERS

- A. If no shut-off is indicated, provide ball valves at inlet connections and balance valves at outlet connections to fixtures and equipment. Provide proper valve trim for service intended.
- B. Use no solder end valves unless noted otherwise; provide adapters in copper tubing systems.
- C. Locate valves with stems above horizontal plane of pipe. In general, locate valves within six

(6) feet of floor, out from under equipment, in accessible locations with adequate clearance around hand wheels or levers for easy operation.

- D. Provide all valves, cocks and strainers, full pipe size unless indicated otherwise.
- E. Provide hand wheel operators on all valves 8” and larger, under 8” lever operators may be used.
- F. Provide tool operated valve with stainless steel shaft extension and 'on deck' tool operation for surge chamber butterfly isolation valve.

3.7 IDENTIFICATION OF PIPING

- A. Identify each valve by a numbered brass tag with hole and brass chain mounted on valve stem or handle. Tag to be a minimum of 1” in diameter and numbers at least 1/4” high stamped into tag. Valves and plumbing lines shall be labeled clearly with the source or destination descriptions.
- B. Install an identification chart in a plastic or glass framed enclosure, which schematically illustrates the proper operation of all piping systems and indicates number and location of all valves and control devices within the system.
- C. The direction of flow for the recirculation equipment shall be labeled clearly with directional symbols such as arrows on all piping in the equipment area. Where the recirculation equipment for more than one pool is located on site, the equipment shall be marked as to which pool the system serves.

3.8 TESTS

- A. Perform tests in presence of Owner’s Representative with no pressure loss or noticeable leaks.
- B. Do not include valves and equipment in tests. Include connection to previously tested sections if systems are tested in sections.
- C. Perform tests as follows:

System	Test Pressure	Test Medium	Duration
Skimmer lines and Lawson Main Drain Sump Lines	20psig	Water*	4 hours
Pool Piping	50 psig	Water*	4 hours
Pool Main Drains	30psig	Water*	4 hours
Domestic Water	150 psig	Water*	4 hours

*Never test PVC pipe or fittings with air or other gases, always use water.

3.9 PIPE MATERIAL APPLICATION

- A. PVC Schedule 40: Below grade swimming pool piping and domestic water piping up to 12”

line size; use standard solvent weld fittings.

- B. PVC Schedule 80: Above grade swimming pool piping up to 12" line size; use solvent weld Schedule 80 or epoxy coated cast iron fittings.
- C. Type L Hard Copper: Above grade domestic water piping.
- D. CPVC Schedule 80; Pool Heater Piping.
- E. Schedule 40 Steel: Natural gas piping.

3.10 CUTTING AND DRILLING

- A. Cutting or drilling necessary for installation of Work of this Section shall be done only with approval of Owner's Representative.

3.11 CLOSING-IN OF UNINSPECTED WORK

- A. Do not cover or enclose Work before testing and inspection. Re-open Work prematurely closed and restore all Work damaged.

3.12 QUIETNESS

- A. Quietness is a requirement. Eliminate noise, other than that caused by specified equipment operating at optimum conditions, as directed by Owner's Representative.

3.13 FLUSHING OF LINES

- A. Flush or blow out pipes free from foreign substances before installing valves, stops or making final connections. Clean piping systems of dirt and dust prior to initial start-up.
- B. Just prior to plastering the pool, under the observations of the IOR, the pool mechanical system shall be flushed using the pool circulation pump. Circulate water through the mechanical system until the effluent water from the pool return heads runs clean.

3.14 CLEAN-UP

- A. After all Work has been tested and approved, the Swimming Pool Subcontractor shall thoroughly clean all parts of the equipment installations, including all pool pipe and fittings in the pool mechanical room. Exposed parts shall be cleaned of cement, plaster and other materials and all grease and oil spots removed with solvent.
- B. The Swimming Pool Subcontractor shall remove debris from the Project site. Cartons, boxes, packing crates and excess materials not used, occasioned by this work shall be disposed of to the satisfaction of the Owner's Representative.
- C. If the above requirements of clean up are not performed to the satisfaction of the Owner's

Representative, the Owner reserves the right to order the work done, the cost of which shall be borne by the Swimming Pool Subcontractor.

END OF SECTION

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SECTION 13 11 08 - SWIMMING POOL ELECTRICAL

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide labor, materials and equipment as required to install the swimming pool electrical system including but not limited to:
1. A complete and operable system of service equipment, switchboards, panelboards, conduits, switches, time clocks and wiring for power and lighting, motor control centers.
 2. Junction and/or pull boxes, conduits, disconnects, starters, contactors, wiring and connection of all motors and mechanical equipment, including connection and wiring of line voltage controls associated with the mechanical systems.
 3. Swimming pool underwater lighting systems.
 4. Swimming pool timing system outlets and scoreboard.
 5. Complete grounding system as required and shown on the Drawings.
 6. Complete equipotential bonding system as required and shown on the Drawings.
 7. Adjusting and preliminary operation of the completed electrical system as described in Article 3.6, A of this Section.
 8. Cleaning of all completed Work and installation adjustment of all trim and decorative items.

1.2 QUALITY ASSURANCE

- A. Qualifications of Workers:
1. The entity performing the work of this Section shall have been successfully engaged in the respective trade for at least five (5) years immediately prior to commencement of the Work.
 2. For actual construction operations, use only trained and experienced workers with a minimum of three (3) years experience with the materials and methods specified.
 3. Provide at least one person who shall be present at all times during execution of the work of this Section, with a minimum of five (5) years experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.
- B. Ordinances and Codes: Materials and construction shall conform with all applicable code requirements, including:
1. National Electrical Code, latest edition; Electrical Safety Orders of the State of California; Department of Industrial Relations; regulations of the State Fire Marshal; rules and regulations of the Board of Underwriters of the Pacific, UL 50, 50E and NEMA 250 rating.
 2. Chapter 31 of California Building Code, latest edition.
- C. Verification of Conditions:
1. The locations shown on the Drawings are diagrammatic only and the exact finish location of equipment and materials cannot be indicated. Therefore, locations of all Work and equipment shall be verified to avoid interferences, preserve head room and keep openings and passageways clear. Changes shall be made in locations of equipment and materials

which may be necessary to accomplish these purposes.

- D. Preliminary Operations and Testing:
 1. Motor driven equipment shall be tested for correct rotation and completion of all connections.

1.3 SUBMITTALS AND SUBSTITUTIONS

- A. Provide submittals in conformance with the requirements of Section 01 33 00. Requests for substitutions shall conform with requirements of Article 1.10.A of Section 13 11 00.
- B. Required submittals include:
 1. Conduit and Fittings as specified in Article 2.2 of this Section.
 2. Panelboards as specified in Article 2.8 of this Section.
 3. Circuit Breakers as specified in Article 2.9 of this Section.
 4. Motor Starters as specified in Article 2.12 and 2.13 of this Section.
 5. Fuses as specified in Article 2.15 of this Section.
 6. Time Clocks as specified in Article 2.16 of this Section.
 7. Ground Fault Circuit Interrupters as specified in Article 2.17 of this Section.
 8. NEMA Type 4x corrosion resistant UL 50, 50E & NEMA 250 rating for enclosures, cabinets and boxes as specified in Article 2.11 & 2.18 of this Section.
- C. Submit proof of qualifications as specified in Article 1.2.A of this Section.

1.4 PRODUCT HANDLING

- A. Delivery: Deliver all materials to the Project Site in the manufacturer's original unopened containers with all labels intact and legible.
- B. Storage: Store all materials under cover in a manner to prevent damage and contamination, and store only the specified materials at the Project site.
- C. Protection: Use all means necessary to protect swimming pool electrical materials before, during, and after installation and to protect the installed Work specified in other Sections.

PART 2 - RODUCTS

2.1 MATERIALS, GENERAL

- A. Materials shall be new, in unbroken packages and bear the U.L. label of approval.
- B. Equipment of one type shall be by same manufacturer. One type of equipment for classifications such as:
 1. Switchboards, panels, buss duct, disconnect switches and allied items.
 2. Conduit.
 3. Wire.
 4. Conduit fittings.
 5. Fixtures of the same general type.

6. Wiring devices.

2.2 CONDUIT AND FITTINGS

- A. Conduit within or under buildings or where exposed outdoors shall be rigid metal threaded, hot dipped galvanized, or U.L. approved plastic except where noted otherwise on the Drawings. Metallic conduit shall be of the same metal between outlets or terminals.
- B. Use flexible metallic conduit only for short connections of motors and where specifically called for on Drawings. Maximum length shall be 40". Use only liquid tight flexible metal conduit. Install an unbroken #12 AWG insulated copper grounding conductor in each liquid tight flexible conduit with permanent connection at motor junction box and service panel ground.
- C. Protect, before installation, metallic conduit runs in all slabs laid on grade or in contact with the earth or exposed in damp locations, with two (2) heavy coats of asphaltum rust-resisting compound.
- D. Encase conduits 2-1/2" or larger run underground, outside, or under buildings, in concrete envelopes a minimum of 3" thick, except as indicated otherwise on Drawings or stubouts. Conduits 2 and smaller laid 18" below finish surface in soil.
- E. Low voltage runs underground outside buildings, 1-1/4" or smaller, may be G.I. or sherardized steel conduit, with machine applied wrapping equal to double wrap or Scotch-Wrap #50 tape, half lapped and quadrupled at joints in lieu of concrete encasement.
- F. Service conduits through foundations or concrete members shall run through metal sleeves with adequate clearances for full movement of the conduit. Do not run conduits through footings.
- G. Secure conduits run exposed on surfaces with one hole heavy-duty straps or fasten with matching fittings to inserts or trapezes, parallel to building walls and ceilings.
- H. Cap all conduit or duct stub-outs with standard factory caps; except cap threaded steel conduit with B.I. water pipe caps in outdoor locations.
- I. Use conduit fittings as manufactured by Crouse-Hinds Company, Appleton Electric Co., or approved equal.
- J. Employ U.L. liquid tight fittings for use with liquid tight flexible metal conduit.
- K. Use unions as manufactured by Appleton, O-Z/Gedney, or approved equal. The use of running threads will not be permitted.
- L. Exposed conduit and fittings in chemical rooms shall be nonmetallic rigid polyvinyl chloride, corrosion resistant rated suitable for installation in corrosive environments and in accordance with the latest NEC requirements.

2.3 EQUIPOTENTIAL BONDING/GROUNDING

- A. Bond together and ground to a common ground at a single point all metallic conduit, piping systems, pool reinforcing steel, metal parts of ladders, lifeguard stands, handrails and their

supports and the like. The solid copper bonding conductor shall not be smaller than #8 copper.

2.4 WIRING CONNECTIONS

- A. Make connections without strain on conductors, allowing the conductors to take a natural position after connections or taps are made. Include all strand of wire in making the connection.
- B. Make connections for wiring by one of the following means:
 - 1. Make all taps or connections to conductors with compression type connectors except those smaller than #8 B&S gauge may have soldered connections. Solderless connections for #10 AWG or smaller may be used and shall be "Scotchlok", Buchanan, or approved equal. For #8 AWG or larger, they shall be T&B "LockTite", Burndy "Versitaps", or approved equal.
 - 2. All cable or conductor terminal lugs shall be Burndy "Quicklug", IlSCO, or approved equal. Two piece stamped lugs and solder lugs will not be approved.
 - 3. Paint taped splices in damp or outdoor locations with two (2) coats of insulating paint.
 - 4. Tag all branch circuit wires with circuit number at the panelboard and at each point of use with linen or plastic tags.

2.5 CONDUCTORS

- A. Copper RHW or THW. Do not make splices between boxes.

2.6 COLOR CODING

- A. Neutrals (identified conductors shall be white).
- B. Phase conductors shall be red for phase B; blue for phase C.
- C. Green shall be used for mechanical equipment and receptacle grounds only.

2.7 MOTOR WIRING

- A. Make final connections to motors with the required AWG (Minimum #12), Flamenol machine tool wire, 19 strand. Control wiring for equipment shall be Flamenol machine tool wire, 19 strand of required AWG. Provide corrosion resistant junction boxes at each item of equipment to change from standard building wiring to machine tool wire.
- B. Phase motors as proper in direction of rotation.

2.8 PANELBOARDS

- A. Panelboards shall be flush or surface mounting as indicated with circuit breakers as shown on panel schedule, hinged lockable doors, index card holders and proper bussing.
- B. Where indicated on the drawings, panelboards shall be furnished with subfeed breakers and/or

lugs, split bussing, contractors, time switches, relays, etc., as required.

- C. All panelboards shall be keyed alike.
- D. All panelboard enclosures shall be corrosion resistant rated in accordance with the latest NEC requirements.
- E. Furnish corrosion resistant panelboard enclosures and terminal cabinets with Yale 46515 flush locks and LL806 keys except where indicated otherwise herein. Fasten the trim to panel boards and terminal cabinet by means of concealed, bolted or screwed fasteners accessible only when the door is open.
- F. Panelboards 208/120 volt, three phase, 4 wire, S/N or 120/240 volt, single phase, 3 wire, S/N.

Panelboard types as manufactured by:

Westinghouse	Type B10B
General Electric	Type NLAB
Square D	Type NQOB

- G. Panelboards for 480/277 volt, three panes, 4 wire, S/N.

Panelboard types as manufactured by:

Westinghouse	Type Pow-R-Line 2
General Electric	Type AE
Square D	Type NEHB
Sylvania	Type NH1B
I.T.E.	Type Approved Equal

- H. Panelboard for bussing sizes thru 400 amp shall be 20" wide surface mounted type. Recess mounted type shall have a 20" wide (maximum) recess metal enclosure with trim plate cover extending 1" on all sides of enclosure. Depth shall be 5-3/4" nominal. Height of panel as required for devices.
- I. Provide 6" additional gutter space in all panels where double lugs are required, or where cable size exceeds bus size. Minimum bottom gutter space shall be 6" high. 12" additional gutter space may be required for aluminum feeders where used.
- J. Panelboards shown on the drawings with relays, time clocks or other control devices shall have a separate metal barriered compartment mounted above panel with separate hinged locking door to match panelboard. Provide mounting sub-base in cabinet for control devices and wiring terminal strips.
- K. Panelboard shall have a circuit index card holder removable type, with clear plastic cover. Index card shall have numbers imprinted to match circuit breaker numbers.

2.9 CIRCUIT BREAKERS

- A. Breakers shall have a minimum short circuit interrupting rating of 10,000A symmetrical for panelboard voltage thru 240 volt and 14000A for panelboards thru 600 volts or as specified on

the drawings. In no case shall the interrupting rating be less than the bus withstand rating unless noted otherwise on the drawings.

- B. Circuit breakers as manufactured by the following companies only are acceptable:
1. General Electric Company
 2. Square D Company
 3. Westinghouse Company
 4. I.T.E. Company
- C. Circuit breakers shall be arranged in the panels so that the breakers of the proper trip settings and numbers correspond to the numbering in the panel schedules on the drawings. Circuit numbers of breakers shall be black-on-white micarta tabs or other previously approved method. Circuit number tabs which can readily be changed from front of panel will not be accepted. Circuit number tabs shall not be attached to or be a part of the breaker.
- D. Where two or three pole breakers occur in the panels, they shall be common trip units. Single pole breakers with tie-bar between handles will not be accepted.
- E. All circuit breakers shall be padlockable in the "off" position. Locking facilities shall be riveted or mechanically attached to the circuit breaker (submit sample for approval). Other means of attachment shall not be accepted without prior written approval of Architect.
- F. Where branch circuit breakers supply the power to motors and signal systems, the breakers shall be furnished with lockout clips, mounted in the "on" position. The breakers shall be able to trip automatically with lockout clips in place.
- G. Panelboard circuit breakers shall be bolt-on type.

2.10 BUSSING

- A. Bussing shall be rectangular cross section copper, or full length silver or tin-plated aluminum.
- B. Bussing shall be braced to withstand symmetrical short circuit ratings as follows or as noted on drawings. In no case shall bus short circuit bracing be less than specified circuit breakers.
- C. Each panelboard shall be equipped with a ground bus secured to the interior of the enclosure. The bus shall have a separate lug for each ground conductor. No more than one conductor shall be installed per lug.

2.11 POOL MECHANICAL EQUIPMENT ENCLOSURES, TERMINAL CABINETS & MISC CABINETS

- A. All pool mechanical equipment enclosures, terminal cabinets and miscellaneous cabinets in the pool mechanical room or chemical storage rooms shall be corrosion resistant rated in accordance with the latest NEC requirements. Enclosures and all cabinets shall be flush mounted (except where noted a surface) of the size indicated on the drawings, and complete with hinged lockable doors and the number of 2-way screw terminals required for termination of all conductors. Terminal cabinet locks to operated form same key used for panelboards. The trim to terminal cabinets shall be fastened by means of concealed bolted or screwed fasteners accessible behind door to terminal cabinets. Terminal cabinets shall have 5/8" plywood

backing.

- B. Provide engraved nameplate on each enclosure and cabinet indicating its designation and system (i.e., Swimming Pool - Panel 'SP').

2.12 MOTOR CONTROL INDIVIDUAL STARTERS

A. Manual Motor Starters:

1. Provide flush or surface mounting manual motor starters with number of poles and size of thermal overload heaters as required for the motor being controlled (equipped with overload heaters, one for each motor lead). Back boxes shall be supplied with all flush mounting starters whether they are toggle type requiring only a 4" square outlet box or the larger type requiring a special box and cover designed to accept the particular unit. All box types shall be corrosion resistant rated in accordance with the latest NEC requirements.
2. Unless otherwise noted on the drawings, all manual starters for single phase motors, smaller than 1 h.p., shall be the compact toggle type. Manual starters for all single phase motors, 1 to 5 h.p., and all three phase motors up to 5 h.p. shall be the heavy duty type.
3. Where manual motor starter is shown with pilot light, the pilot light shall be installed in a separate outlet box adjacent to the starter outlet, and engraved nameplate in indicate function of pilot light.
4. The following motor starters as manufactured by:

Manufacturer	Single Phase 1HP and Below	Others
Arrow Hart	Type RL	Type LL
General Electric	CR 101	Class CR 1062
I.T.E.	Class C10, C11 or C12	Class C20
Square D Company	Class 2510, Type A	Class 2510, Type B & C
Westinghouse	Type MS	Type A100
Allen Bradley	Approved Equal	Approved Equal.

B. Individual Magnetic Motor Starters:

1. Magnetic motor starters shall be A.C. line voltage, across-the-line units in a corrosion resistant rated enclosure in accordance with the latest NEC requirements.
2. All starters located outside of a building whether or not indicated shall be W.P. (weatherproof), and all starters noted W.P. shall be furnished in a corrosion resistant rated stainless steel enclosure in accordance with the latest NEC requirements.
3. Starter shall be horsepower rated for the motor controlled, and shall be equipped with properly sized overload elements. Every pole shall be with overload element.
4. Verify the exact motor current and voltage characteristics with the Contractor supplying the motor before installation of a starter.
5. Each starter shall be equipped with "Hand-Off-Auto" switch or stop-start pushbutton as required.
6. Coils shall be designed to operate on voltage indicated on control diagrams and have built-in-under the voltage release for coil circuit to drop motor starter off the line when the line voltage drops below normal operating voltage.
7. The coil control circuit shall be independently fused, sized to protect coil.
8. Starters to be equipped with running pilot light indication with a "Push-to-Test" feature.

- 9. Magnetic starters shall have a minimum of two auxiliary contacts. Additional auxiliary contacts shall be provided as required to comply with the requirements of the wiring diagrams on the electrical and mechanical drawings and the description of the function in the Mechanical Section of the Specifications.
- 10. Starters shall comply with NEMA standards, size and horsepower ratings as indicated on drawings.
- 11. The following types of magnetic motor starters as manufactured by:

Manufacture	Type
General Electric	Class CR 106
I.T.E.	Class A20
Square D Company	Class 8536
Westinghouse	Type A200 (Size 4 Max.) or Class II-200 (Sizes 5-8)

2.13 INDIVIDUAL COMBINATION MOTOR STARTERS

- A. Combination starter shall incorporate fused disconnect switch and individual magnetic motor starter. Combination starters shall be mounted in a corrosion resistant rated enclosure in accordance with the latest NEC requirements.
- B. Starters shall comply with NEMA standards, size and horsepower ratings as indicated on drawings General Electric, Square D, Westinghouse or I.T.E.
- C. The disconnect handle used on combination starters shall control the disconnect device with the door opened or closed. The disconnect handle shall be clearly marked as to whether the disconnect device is "ON" or "OFF", and shall include a two-color handle grip, the black side visible in the "OFF" position indicating a safe condition, and the red side visible in the "ON" position indicating an unsafe or danger condition.
- D. All starters used in combination starters shall be manufactured in accordance with the latest published NEMA standards, sizes, and horsepower ratings. These starters shall be furnished with three melting alloy type thermal overload relays.
- E. Thermal units shall be of one-piece construction and interchangeable. The starter shall be inoperative if a thermal unit is removed.

2.14 MOTOR CONTROL CENTER, INTERLOCKS AND CONTROL DEVICES

- A. Refer to mechanical and plumbing drawings and specifications and provide all control devices including timeswitches, relays and interconnection of starters as required.
- B. Mount all relays and timeswitches in a separate compartment in motor control center unless otherwise indicated.
- C. Whether shown on mechanical and plumbing drawings or control center schedules or not, where motors are controlled by external devices (i.e., thermostats, relays, float or pressure switches, etc.) or interlocked with other motors, each motor starter to be equipped with a "Hand-Off-Auto" selector switch in starter cover. Other starters equipped with a "Start' Stop" pushbutton station in starter cover. The Contractor shall be responsible to submit a complete and detailed set of shop

drawings, electrical schematic design along with electrical component cut sheets from the MCC panel or the interlock control device manufacturer. RSD Total Control: Allan Pearson 949-380-7878, South Coast Controls: Anthony Ellis 714-998-5656 or approved equal.

2.15 FUSES

- A. Fuses shall be dual element, current limiting type, U.L. Class RK5 unless otherwise indicated on the drawings. Provide one spare set of fuses of each size and type in each motor control center.

2.16 TIME CLOCKS

- A. Time clocks shall be provided for all underwater lighting systems and swimming pool circulation pumps not controlled by filter microprocessors.
- B. Contacts shall have a minimum rating of 40 amperes at 277V.
- C. Timing motor shall be heavy duty synchronous, self starting, high torque type, and shall be rated at 120, 208, 240, 277 volt 60 Hz.
- D. Motor shall operate normally at temperature range of -60 degrees Fahrenheit to +120 degrees Fahrenheit.
- E. Dial shall be 3" diameter, clearly calibrated with day/night zones and 24 hour rotation, with gear to provide one revolution yearly which automatically varies the on/off settings each day according to seasonal changes. Day and month of the year shall show clearly through calendar window on the dial.
- F. Time clocks shall be equipped with 7-spoke omitting wheel marked with days of the week.
- G. Time clocks shall be housed in a corrosion resistant rated enclosure in accordance with the latest NEC requirements.
- H. Acceptable manufacturers are Intermatic, Tork, Paragon, or approved equal.

2.17 GROUND FAULT CIRCUIT INTERRUPTERS

- A. Minimum rating shall be 20 amperes, 125V, 5 milliampere trip setting, Class A per UL943.
- B. Manufacturer to be Crouse-Hinds, Leviton, or approved equal.

2.18 BOXES

- A. Boxes shall be of the size required by ordinances or larger, must be corrosion resistant in accordance with the latest NEC requirements where concealed or exposed on ceilings or walls.
- B. Outlets to be surface where wiring is exposed and flush in areas where conduit is concealed.

- C. Provide surface outlets with proper corrosion resistant surface covers. Box and cover shall be deep enough to provide at least 1/4" clearance between back of device and back of box. Where box contains more than one device, use a corrosion resistant rated gang box with proper cover in accordance with the latest NEC requirements. Surface outlet boxes shall be of the threaded hub type wherever below 8'0".
- D. If necessary for cable installation, additional pull boxes or junction boxes may be installed in accessible locations. Exposed pull boxes and junction boxes shall be corrosion resistant rated in accordance with the latest NEC requirements.
- E. Where exposed to weather pull boxes larger than outlet boxes are required, galvanized code gauge sheet steel boxes may be used with covers attached by brass machine screws may be used. Boxes exposed to the weather shall be approved for the purpose, and conduit entrances shall be on the bottom made by means of an interchangeable hub with gasket and adapter nut. Pull boxes not shown on Drawings may be added only after approval of size and location is obtained.
- F. For outlets exposed to weather or where noted, cast outlet boxes shall be Crouse-Hinds, Appleton, or approved equal. Boxes shall have proper number and size hubs. Device plates, covers, adapters and boxes shall be as manufactured by Crouse-Hinds, Appleton, or approved equal.
- G. Exposed junction boxes, outlet boxes and pull boxes for pool chemical rooms shall be non - metallic suitable for a corrosive environment and in accordance with the latest NEC requirements.

2.19 IDENTIFICATION MARKINGS

- A. Plainly mark all motor and electrical appliance control equipment indicating the equipment controlled with engraved metal tags.
- B. Provide laminated plastic nameplates on panelboards on the outside of the door at the top indicating panel designation and feeder source.
- C. Provide laminated plastic nameplates on distribution switchboards and motor control centers at the top center indicating panel designation and feeder source.
- D. Identify each distribution switchboard and motor control center circuit breaker with a laminated plastic nameplate indicating its' use.
- E. Type panelboard directories on the forms provided with the equipment, indicating the use of each branch circuit breaker.
- F. Fasten all laminated plastic nameplates to surfaces with two (2) or more screws.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify conditions at the Project site before submitting bid. Be responsible for providing all necessary wiring for the new electrical systems. Wherever wiring is being disrupted due to remodeling or changes, reconnect existing and provide new wiring circuits to accomplish a fully operable system at no additional cost to the Owner.

3.2 COORDINATION

- A. The Drawings are essentially diagrammatic and indicate the desired location, size, routes, connection points, etc., and are to be followed as closely as possible. Proper judgment must be exercised in executing the Work so as to provide the best possible installation in the available space and to overcome difficulties, limitations or interference wherever encountered. Be responsible for the correct placement of this Work, the proper location and connection in relation to Work of other trades, for determining the exact location of all conduits, outlets and equipment, and for installing the conduits in such a manner as to conform to the structure, avoid obstruction, preserve headroom and keep openings and passageways clear. Particular attention is directed to the close coordination required on exposed Work. Locations shown on Architectural or Mechanical Drawings if different than those shown on Electrical Drawings should be communicated to the Owner's Representative in writing for clarification.

3.3 INSTALLATION

- A. Trenching and Backfill: Conform with requirements of Section 13 11 01. Provide minimum cover as required by Code.
- B. Conduit Installation:
 1. Conduit and metallic raceway systems shall be mechanically and electrically continuous from sources of current to all outlets in a manner to provide a continuous grounding path. Close ends of conduit during construction to prevent entrance of dirt or moisture.
 2. Securely fasten conduit to the building construction within three feet of each outlet and within every ten feet thereafter. Secure it to boxes, cabinets, pull boxes, terminals with two locknuts and ends equipped with bushings or a terminal fitting. Cut square with ends carefully reamed.
 3. Make bends or elbows so that the conduit will not be injured or flattened.
 4. Use insulated metallic bushings in all places where bushings are required.
 5. Run exposed conduits level or plumb and parallel to the construction members of the building. No cutting across or diagonal runs will be permitted. Neatly surmount structural obstructions encountered on conduit runs by the use of fittings or pull boxes.
 6. Identify feeder conduits by stamped metal tags secured to exposed section of conduit in main or sub-panels.
 7. Make up all threaded conduit joints gas and watertight with conductive sealer except conduit above ground in dry indoor locations.
 8. Rigidly support all boxes independently of the conduit system.
- C. Connections to Equipment:
 1. Fully connect, in an approved manner, all electrical outlets, apparatus, motors, equipment, fixtures, wiring devices and appliances whether they are installed under the Electrical Contract or not, which require electrical connections, to the corresponding electrical system outlet.
 2. Where the Work of this Section requires connections to be made to equipment that is furnished and set-in-place under other Sections, obtain such roughing-in dimensions from

the manufacturer or supplier of each item as required and assume full responsibility for the installation of the connections thereto.

3.4 ADJUSTMENT AND CLEAN-UP

- A. Preliminary Operation: Should the Owner's Representative deem it necessary to operate the electrical installation or any part thereof prior to Substantial Completion of the Work, consent to such preliminary operation and supervise conduction of same. Subcontractor shall pay all costs occasioned by such operation. Preliminary operation shall not be construed as an acceptance of any Work installed under this Contract.
- B. Clean-up: Upon completion of the Work of this Section, immediately remove all swimming pool electrical materials, debris and rubbish occasioned by this Work to the approval of the Owner's Representative.

END OF SECTION

SECTION 13 11 09 - PREFABRICATED SWIMMING POOL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, General Conditions, Supplementary Conditions and Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section includes the following items:
 1. Prefabricated Wall System.
 2. Prefabricated Gutter System.
 3. Prefabricated Headwall Assemblies.
 4. Base Frames, Buttresses, Panel Supports and other structural support components.
 5. Prefabricated Bottom Drains.
 6. Moveable bulkhead with track and starting platform anchors.
 7. PVC Floor Membrane:
 - a. Normal.
 - b. Anti-slip.
 8. Inlets:
 - a. Floor.
 9. Accessories:
 - a. Floating Line Anchors.
 - b. Wall Targets.
- B. Related Sections include the following:
 1. Division 13 Section 13 11 02 "SWIMMING POOL CONCRETE" for additional concrete pool foundation tolerance and finishing requirements

1.3 DEFINITIONS

- A. Base Frame: Structural steel member bolted to bottom panel flange and concrete foundation designed to provide adjustable interface between wall panels and concrete foundation.
- B. Bottom Drain: Drain typically placed at lowest portions of pool typically used to drain the pool but may also be used in conjunction with filtration. Often termed 'Main Drain'.
- C. Buttress: Structural steel member bolted to panel support or base frame and foundation designed to transfer applied loads to the foundation.
- D. Floating Line Anchor: Steel component at pool perimeter used to secure the ends of floating lines. May be one of several available types depending on pool design.
- E. Floor Underlayment: Material placed between the foundation and the PVC floor membrane, which may be designed to cushion the floor, buffer imperfections in the floor finish, provide a

sub-membrane drainage layer, etc.

- F. Gutter: Component of wall system designed to convey water from the pool along it's perimeter to the filtration system.
- G. Gutter Mounted: An accessory supported by steel brackets attached to the gutter system designed to reduce the need for deck equipment. May consist of handrails, line anchors, stanchion sockets, or other accessories.
- H. Inlet: Water distribution device located at finished pool wall or floor used to distribute water from filtration system into the pool.
- I. Liquid PVC: PVC dissolved in a solution that, when exposed to air, will bond to PVC and harden to form a seal.
- J. Panel Support: Steel member bolted to the wall panels at panel seams.
- K. Primary Components: Structural or critical elements of pool assembly. Primary components include, but are not necessarily limited to, base frames, wall panels, panel supports, buttresses, gutters, and gutter supports, concrete anchors, and PVC membrane.
- L. PVC Membrane: Flexible sheet PVC of typically small thickness formed into rolls for use in various applications.
- M. PVC Rope: Strips of PVC used in conjunction with a heat welding process to provide a primary seal in many applications.
- N. PVC Welding: Process of bonding two or more PVC elements by using a special heat tool to melt adjacent layers of PVC then applying pressure to allow the melted layers to bond and cool.
- O. Secondary Components: Less critical elements of pool assembly and fasteners. Secondary components include, but are not necessarily limited to, fasteners, accessories, grilles, PVC sealants and seaming materials, and tile and tile components.
- P. Structural Supports: Base Frames, panel supports, buttresses, etc. designed to provide structural stability to wall system.
- Q. Wall Panels: Fabricated sheet steel components, which when properly connected and supported, provide pool wall surface and waterproofing.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Install prefabricated swimming pool components utilizing manufacturer's standard and/or custom components and assemblies integrated into a complete system that form a pool capable of withstanding imposed structural loads, thermally imposed movement, and deterioration from weather, site, and service conditions at a minimum as specified in this Article.
- B. Structural Performance: Install wall panels, structural supports, structural connections capable of withstanding the effects of soil (backfill) pressures, and hydrostatic & other loads and resulting stresses within the limits without leakage and under the conditions indicated:

1. Lateral Backfill Loads: Include lateral loads including lateral soil pressure, pool decks, other significant adjacent structures, and overburden created by compaction efforts performed in conformance with compaction techniques specified in this Article.
 2. Hydrostatic Loads: Include lateral loads induced by the presence of water within the pool.
 3. Lateral Live Loads: Include loads induced by contact of swimmers with the structure under intended use conditions.
 4. Seismic Loads: Include lateral loads that may be induced into the structure from seismic activity. Consult applicable building codes and geotechnical information as required.
 5. Load Combinations: Install pool system to withstand the following load combinations:
 - a. Lateral Backfill.
 - b. Hydrostatic.
 - c. Hydrostatic + Lateral Backfill + Lateral Live.
 - d. Hydrostatic + Lateral Backfill + Lateral Live + Seismic.
 6. Deflection Limits: Install assemblies to withstand design loads with deflections no greater than the following:
 - a. Structural Bracing: Horizontal deflection of 1/250 of the height, not to exceed .015 inches.
- C. Water Penetration for Wall and Floor Systems: Install wall and floor assemblies manufactured and installed with no water penetration (leakage) through the system(s). PVC shall be continuous across connections between wall panels, between wall panels and floor membrane, and across joints between sections of floor membrane.

1.5 SUBMITTALS

- A. General: For the following items in this section, submit 6 sets of documents. Provide submittals in accordance with the requirements of section 01 33 00.
- B. Product Data:
 1. Wall Panels.
 2. Structural Supports.
 3. Gutters.
 4. Connections & Interface Components.
 5. Headwall Assemblies.
 6. Drains.
 7. Inlets.
 8. Floor Membrane.
 9. Accessories.
- C. Shop Drawings: Include plans indicating the type of system & structural components and the type and number of accessories provided.
- D. Product Certificates: Signed by manufacturer of pool system certifying that products furnished comply with requirements.
- E. Installer Certificate: Signed by manufacturer certifying that installation contractor complies with requirements.
- F. Manufacturer Certificate: Signed by manufacturer certifying that they comply with requirements.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has specialized experience in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer and who has successfully completed five (5) projects similar in scope and size within the past five (5) years. Temporary installations will not be considered for reference completed projects.
- B. Pre-installation Conference: Conduct conference at Project site prior to start of installation.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Contractor shall deliver components and other manufactured items to the Project Site so as not to be damaged or deformed. Package small components together in crates or containers to prevent loss of small items. Package hazardous and/or sensitive materials together and clearly labeled to indicate use of caution or extra attention is required. Finished panels shall be covered with continuously applied adhesive-fixed protective layer to prevent damage to panel surface. Bundle and secure components to prevent scattering and damage to other materials during shipment.
- B. Storage at Project Site:
 - 1. All pool components shall be stored and staged with sufficient site safety and security to ensure damage or losses from vandalism, theft, and weather do not occur.
 - 2. Stack non-structural materials on platforms or pallets, covered with tarpaulins or other suitable weather tight and ventilated covering. Store underlayment and boxed items to ensure dryness. Do not store wall panels, PVC membrane, PVC profiles, or other soft-finish items in contact with other materials that might cause staining, denting, or other surface damage, or in direct sunlight.
 - 3. Store hazardous materials as follows:
 - a. Store in a climate-controlled environment within temperature ranges specified by product manufacturer.
 - b. Keep out of direct sunlight.
 - c. Store away from open flame or sources of heat.
 - d. Comply with applicable safety regulations governing hazardous material storage and handling.
- C. Handling: Unload, store, and erect manufactured pool components to prevent bending, warping, twisting, and surface damage.

1.8 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when weather conditions permit installation according to manufacturer's written instructions and warranty requirements. Various phases of installation may have differing requirements.
- B. Field Measurements: Prior to commencement of installation, site conditions shall be approved in writing by installation contractor as specified in Section 3.1 'Examination'. As projects may be phased, installation contractor shall only approve those portions of the project ready for pool installation.

- C. Concrete Surfaces: At all times concrete floor shall be protected from oil, paint, solvents, etc., as many of these items will damage PVC membranes. Installation contractor and manufacturer shall be notified in writing if such items do come in contact with concrete floor. These items shall be remedied as required by manufacturer at Contractor's expense.

1.9 COORDINATION

- A. Coordinate size and location of concrete footings, stem walls, and floors. Concrete, reinforcement, and formwork requirements are specified in Division 13 Section 13 11 02 "SWIMMING POOL CONCRETE."
- B. Facilitation of storage and staging of hazardous and non-hazardous materials in conformance with Section 1.7 'Delivery Storage & Handling' requirements.
- C. Contractor to coordinate quality control inspections with the pool manufacturer and Architect. Contractor will notify the manufacturer to visit the site at the following milestones to inspect the work completed and report if any corrections are required. Contractor will provide to Architect, manufacturers site visit report noting conditions and quality of work completed.
 1. Delivery
 2. Structure assembly
 3. Waterproofing / Membrane installation
 4. Waterproofing / Membrane installation completion prior to water fill.
 5. Final Inspection

1.10 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Warranty on Prefabricated Pool System: Written warranty, executed by manufacturer agreeing to repair or replace pool system components provided by manufacturer that have failed and/or directly result in leakage of the pool.
 1. Warranty Period: Water-tightness and structural integrity-fifteen years from date of Substantial Completion. Plastic grille structural integrity-one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Myrtha Pools, no known equal.

2.2 STRUCTURAL COMPONENTS

- A. Primary components shall be fabricated by cold working from AISI 304 or 316 stainless steel

sheet or standard shapes.

- B. Secondary components shall be grade AISI 304 stainless steel (minimum) and may be fabricated by hot-working as required.
- C. Anchor Rods, Bolts, Nuts, and Washers. As follows:
 - 1. Grade AISI 304 stainless steel minimum.
- D. Chemical Anchors
 - 1. Chemical anchor capsules in accordance with ASTM E 1512

2.3 PVC-COATED STEEL MATERIALS

- A. Stainless Steel Sheet: Grade AISI 304 stainless steel minimum.
- B. PVC-Coated Stainless-Steel Plate: All PVC coated stainless steel components shall be constructed from PVC coated stainless steel sheet (or blanks) manufactured by hot calendaring PVC to the stainless-steel sheet. The bonded PVC shall withstand tensile (de-lamination) force of 27 lb on a sample if 1” at 180° angle de-lamination.

2.4 PVC MEMBRANE

- A. Floor Membrane: PVC floor membrane shall be a reinforced PVC geo-membrane (chemically coated fabric) with the following properties:
 - 1. Minimum thickness of 1.5mm in accordance with ASTM D 374.
 - 2. Minimum resistance to tearing of 90 lb/90 lb in accordance with ASTM D 1004.
 - 3. Minimum resistance to peeling of 130/130 N/mm in accordance with ASTM D 638

2.5 FABRICATION, GENERAL

- A. General: Design components and field connections required for erection to permit easy assembly.
 - 1. Mark a minimum of one of each part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
 - 2. Fabricate elements to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Cold-formed members shall be free of cracks, tears, and ruptures.
- B. Primary Components: Shop fabricate all aspects of primary structural components and panels. Punch/bend all elements including punching of holes for filtration components, through-panel fasteners, lights and accessories, bolted connections and bending of flanges for bolted connections and recesses. Field cutting/modification of primary components is not permitted.

2.6 2.6 STRUCTURAL SYSTEM

- A. Structural Elements: Manufacturer's standard structural primary system, designed to withstand required loads and specified requirements. Primary system includes base frame, wall panels, panel supports, buttresses, gutter supports and gutters.
 - 1. General: Provide structural elements with required splice members. Factory drill or

punch for field-bolted assembly.

- a. Slight variations in pool depth, locations of accessories, and locations of change in floor slope may be acceptable if necessary to meet manufacturer's standard, as approved by Architect.
 2. Retain one of four subparagraphs below.
 3. Base Frames: 'C'-shaped sections fabricated from cold-worked steel (14ga (2mm) steel sheet minimum). Frame construction shall ensure tight horizontal tolerance and allow for vertical adjustment to compensate for variations in finished concrete.
 4. Wall Panels: Panels fabricated from cold-worked PVC laminated steel (14ga (2mm) steel sheet minimum). Panel construction shall provide for flanged-bolted connections with compatible steel with no through-panel fasteners below tile line. Flange bolt spacing shall not exceed 6" without utilizing flange stiffening element. Wall panels will have a protective plastic film on the interior face (water side) of the panel that will be removed during the installation process, before the pool is filled with water. Wall panels will have a clear, protective coating applied to the exterior face to provide a permanent shield against oxidation from chlorinated atmosphere.
 5. Panel Supports: Panel supports fabricated from cold-worked steel (14ga (2mm) steel sheet minimum). Flanges, connection plates, and stiffening elements shall be fabricated by cold-working (no steel welding is permitted).
 6. Buttresses: Structural braces fabricated from 14ga (2mm) steel sheet minimum. In lieu of fabrication from cold-worked sheet, buttresses may be fabricated from hot or cold formed standard angle, c, zee or other standard section provided all additional flanges, connection plates, and stiffening elements are fabricated by cold-working (no steel welding is permitted).
 7. Gutter Supports: Brackets fabricated from cold-worked steel (14ga (2mm) steel sheet minimum). Gutter supports shall be fabricated integrally with panel supports or separately provided gutter support construction provides for bolted connection to panel supports.
 8. Gutter: Channels fabricated from cold-worked PVC laminated steel (14ga (1.5mm) steel sheet minimum). Gutter construction shall provide for flanged-bolted connections with compatible steel between gutter segments. Gutter splice plates are not permitted. Gutters/gutter supports for tile finished gutters shall be constructed with permanent adjustment system to level gutter at skim line prior to installation of tile (floating of tile on gutter or adjustment of coping over 1/8" to obtain level skim is not permitted). Gutters will have a protective plastic film on the interior face (water side) of the gutter that will be removed during the installation process, before the pool is filled with water. Gutters will have a clear, protective coating applied to the exterior face to provide a permanent shield against oxidation from chlorinated atmosphere.
 9. Gutter Drain Flanges: Flanges fabricated from hot or cold formed steel. Flanges may be secured to gutter or gutter drain manifold by steel welding. Flanges shall be fabricated to connect to standard PVC flanges. Gutter drains placed in accordance with the Architects drawings. No flanges in the gutters is permitted; this would obstruct the free flowing of water into the drain.
- B. Structural Anchoring: Provide anchoring to foundation as follows:
1. Rods: Hilti HAS-R AISI 316 Stainless Steel in Epoxy filled holes in accordance with anchor manufacturer's written instruction.
- C. Connection Hardware: Provide stainless steel bolts, nuts, washers, screws, etc. for fasteners in permanent contact with stainless steel elements, whether through head contact or by penetration through the steel. Bolts/nuts shall be fabricated to prevent seizing (standard bolts with field-applied anti-seize solution are not acceptable).

2.7 STEEL ACCESSORIES

- A. Line Anchors: Shall be designed and fabricated to withstand forces specified by floating line manufacturer or by recognized swimming authority. Line anchor construction shall utilize third party bracing elements (not solely supported by wall panel) and/or utilize pool structural system to provide resistance to service forces (line anchors secured only to wall panels are not permitted).
- B. Gutter Mounted Elements: Shall be designed and fabricated to withstand forces specified by accessory manufacturer and/or recognized swimming authority in addition to those service conditions specified by governing code officials. Exposed steel shall be polished stainless steel.
- C. Bottom Drains: Shall be fabricated from cold worked PVC laminated steel (14ga (2mm) minimum) and/or rigid PVC to facilitate PVC membrane welding at drain edges or fabricated from sheet steel having 16ga (2mm) minimum thickness be equipped with a steel flange, counter flange, two gaskets, compatible fasteners designed to prevent seizing. Drains shall be designed and fabricated to facilitate monolithic concrete slab or block-out type installations and concrete bonding. Drains shall be equipped with grounding lugs or holes for connecting grounding wiring.

2.8 PLASTIC GRILLES & ACCESSORIES

- A. Gutter Grilles: Grilles fabricated in multiple-interchangeable segments. Grilles shall be fabricated with buffers or slats parallel to pool edge to limit deck splash-over.

2.9 SOURCE QUALITY CONTROL

- A. This Article covers tests and inspections performed at the source to verify that products and materials comply with requirements.
- B. Manufacturer shall present certificate of ISO 9001 (or better) registration or the following:
 - 1. Manufacturer will employ an independent testing agency chosen by Contractor to perform source quality-control testing and special inspections, and to prepare test reports.
 - a. Testing agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements.
 - b. Manufacturer shall allow testing agency access to places where structural/primary components are being fabricated or produced and cooperate with testing agency and provide samples of materials as may be requested for additional testing and evaluation.
 - 2. Manufacturer shall correct deficiencies in or remove and replace primary components that inspections and test reports indicate do not comply with requirements.
 - 3. Additional testing, at manufacturer's expense, will be performed to determine compliance of corrected Work with requirements.
 - 4. Testing agency will report test results promptly and in writing to Contractor and Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site Conditions: Installation contractor shall confirm in writing suitability of project site to proceed with installation. Items to be confirmed shall include but are not necessarily limited to:
 - 1. Accessibility to pool area.
 - 2. Safety of pool excavation.
 - 3. Ability to store and stage materials in conformance with Section 1.7 ‘Delivery Storage & Handling’

- B. Field Measurements: Construction of the pool foundation and floor shall be coordinated and confirmed as follows:
 - 1. A survey shall be conducted of the formwork for the foundation for the complete pool system (including footings and floor slab) by a qualified independent surveyor. A drawing and/or report of their findings shall be submitted for review. Along with other applicable information, statement of compliance with construction documents is required. Surveyor shall specifically consider the following:
 - a. World and relative placement of pool foundation
 - b. Vertical and horizontal line
 - c. Elevation
 - d. Allowable construction tolerance
 - 2. Upon completion of the concrete pool foundation, a final survey will be conducted by installation contractor. A drawing and/or report of their findings shall be submitted for review. Deficiencies in any of the areas listed below shall be identified along with other applicable information. The installation contractor along with the manufacturer shall note in writing any possible recommendations for correction of deficient conditions and advise of possible delays and additional costs that may result as soon as possible, specifically considering the following:
 - a. World and relative placement of pool foundation
 - b. Horizontal line
 - c. Elevation
 - d. Concrete finish

- C. Site inspections, contractor to request and coordinate inspections by a manufacturer representative pursuant to the requirements of specification section 13 11 09, paragraph 1.9C

3.2 PREPARATION

- A. Clean concrete as follows:
 - 1. Mud and dirt shall be swept or washed from concrete floor.
 - 2. Oil, paint, and solvents shall be cleaned and surfaces treated per manufacturer’s recommendations as required in Section 1.8.C ‘PROJECT CONDITIONS’.

3.3 TANK INSTALLATION

- A. Install pool system according to manufacturer's written instructions and installation drawings.
- B. Install grounding for steel components according to applicable articles and governing codes.
- C. Prior to component installation, all primary components shall be inspected for damage or defect. Do not install damaged or defective components. Notify pool manufacturer

immediately of any damaged or defective components.

- D. Do not field cut, drill, or alter primary members without written approval from pool system manufacturer.
- E. Set primary and secondary components in locations and to elevations indicated and according to manufacturer's written specification. Maintain structural stability of pool during installation.
- F. Base Frame:
 - 1. Connect all base frame elements and set into position prior to leveling to ensure all components are manufactured to the required overall dimensions.
 - 2. Attach base frame to concrete as required to ensure both finished line and elevation are maintained throughout installation.
- G. Wall Panels, Panel Supports, Buttresses, and Gutter Supports.
 - 1. Stage wall panels as required around pool perimeter to protect panel surface at all times.
 - 2. Remove protective panel covering from connecting flanges to prevent covering from being trapped between connecting flanges.
 - 3. Connect wall panels to base frame, panel supports and adjacent wall panels per manufacturer's recommendations with as few bolts as required to prevent gapping between panels. Gutter supports may be installed at this time.
 - 4. Connect buttresses to panel supports and panel supports to foundation to ensure walls are properly braced during installation.
 - 5. After wall segments are installed from end-to-end, install remaining fasteners and tighten per manufacturer's recommendations.
 - 6. Perform final adjustment of wall verticality (and horizontal line if necessary).
 - 7. Final tighten anchors.
- H. Gutters & Gutter Supports:
 - 1. Connect remaining gutter supports to panel supports.
 - 2. Attach gutter segments to wall panels/gutter supports/adjacent gutter segments per manufacturer's recommendations with as few bolts as required to prevent gapping between gutter segments.
 - 3. Final tighten gutter segment-to-gutter segment flanges.
 - 4. Final tighten remaining fasteners.
 - 5. Once all gutter segments are fixed place, adjust all skimming sections of gutters to constant water level.

3.4 WALL PANEL SEALING

- A. General: Install uniform-watertight PVC seals.
 - 1. Wall panel sealing shall be performed according to manufacturer's written instructions.
 - 2. Mechanical (welded PVC) and chemical seals shall be applied within temperature and climatic ranges specified by manufacturer.
- B. Mechanical Seals:
 - 1. Clean surfaces of dirt, dust, debris, and adhesive film by scrubbing with a lightly abrasive fabric or cloth and a mild detergent. Rinse surfaces.
 - 2. Install PVC rods and/or strips to minimize joints and splices.
 - 3. Rods and strips shall be welded to panel to ensure good bond, free of exposed scorching, and free of substrate blisters and wrinkles.

4. Exposed edges of strips and rods shall be chemically sealed as specified in the following item 3.4.D 'Chemical Seals'.

C. Chemical Seals:

1. Clean surfaces of dirt, dust, debris, and adhesive film by scrubbing with a lightly abrasive fabric or cloth and a mild detergent. Rinse surfaces.
2. Avoid application of harsh chemicals and primers on exposed-finished PVC.
3. Ensure substrate remains dry throughout application and curing of chemical seal.
4. Apply liquid PVC in thin layers to prevent forming of bubbles in curing PVC. Seal layers shall be free of such bubbles.
5. Sealant layers applied within four hours over previous layers do not require additional cleaning before application of additional layers. After four hours, sealed surfaces shall be cleaned with cloth or sponge and mild detergent and water.

3.5 PVC MEMBRANE INSTALLATION

A. Inspection:

1. Prior to Work of this Section, carefully inspect the installed Work of other trades and verify that all such Work is complete to the point where this installation can properly commence
2. Verify that swimming pool membrane can be installed in accordance with the original design and all referenced standards, including proprietary application techniques and application training/certifications.

B. Discrepancies:

1. In the event of discrepancy, immediately notify the Architect.
2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved
3. Failure to notify the Architect and give written notice of discrepancies shall constitute acceptance by the Contractor of existing conditions as fit and proper to receive the Work.

C. Installation

1. Completion of other work: DO NOT commence installation of membrane of swimming pool(s) until the following conditions have been met:
 - a. The Health Department and/or other governing agencies have approved the pool(s) plumbing installation.
 - b. All concrete pool deck construction is complete and the pool decks have been thoroughly cleaned.
 - c. All landscaping in areas adjacent to the pool(s) or spa(s) is complete and the landscape irrigation system is operable.
 - d. All painting in the pool area is complete.
 - e. All welding and grinding in locations adjacent to the pool area are complete.
 - f. The backwash sewer connection is complete.
 - g. Pool(s) and/or spa(s) area(s) perimeter fencing installation is complete.
 - h. All trash and debris have been removed from areas adjacent to the pool(s) or spa(s), particularly those areas that are normally upwind from the pool(s) or spa(s).
 - i. All dust raising construction and/or activities in areas adjacent to the pool(s) or spa(s) are complete or mitigated.
 - j. The circulation system is/are operational.
 - k. The mechanical system has been flushed sufficiently to remove all dirt and debris from the piping system.

- l. All necessary chemicals (Chlorine, pH adjuster, Sodium Bicarbonate and Calcium Chloride or any other required chemicals) are on site and ready for use.
 - m. Obtain written approval from the Owner and the Architect
- D. Contractor accepts all liability from damage done to the pool membrane and wall panels if the pool(s) membrane installation is before the completion of the above listed items or without the written approval of the Owner and the Architect.
- E. Install membrane according to manufacturer's written instructions and installation drawings.
- F. Prior to permanent fixing or welding, PVC membrane shall be inspected for visible defects or blemishes. Do not install damaged or defective membrane. Notify pool manufacturer immediately of any damaged or defective membrane.
- G. PVC membrane shall be stretched both longitudinally and transversely to prevent wrinkles from forming. Wrinkled PVC membrane shall be removed and replaced.
- H. Seams:
- 1. All seams in membrane and connections between membrane and wall panels shall be heat continuously welded a minimum of 38mm (1-1/2"). Heat welding devices explicitly designed for PVC membrane welding shall be utilized for welding. Welds shall be spot checked per manufacturer's written instruction prior to final seam sealing.
 - 2. PVC weld seams shall not extend into flanged accessory connections. Utilize secondary PVC section to provide uniform surface for flanged connections.
 - 3. Exposed PVC membrane edges shall be sealed with liquid PVC or by heat sealing according to manufacturer's written instructions.
- I. Pool Filling:
- 1. After the membrane installation has been completed and all PVC joints have cured gradually fill the pool with water within 24hrs, preventing all damage to finished membrane and wall panel surfaces.
 - 2. Flow the water continuously until the pool is filled.
 - 3. Coordinate with Contractor to ensure that the pool is continuously monitored while filling to prevent overflow
- J. POOL MEMBRANE AUTHORIZATION FORM:
- 1. The competition and instructional pool membrane liner installations at Mission Oak High School are hereby approved and may proceed with filling of water. Pursuant to the requirements of specification section 13 11 05, paragraph 3.1.

Owner

Date

Architect / Project Manager

Date

Manufacturer Representative

Date

3.6 ACCESSORIES INSTALLATION

- A. General: Install accessories according to accessory manufacturer and pool manufacturer’s written instructions and installation drawings and install grounding for steel accessories according to applicable articles and governing codes.
- B. Floor Inlets
 - 1. Remove screws, cover plates, flanges, and gaskets and store well-marked in secure location.
 - 2. Setting:
 - a. Set inlets as required to flush flange of inlet with finished top surface of PVC floor membrane. Setting may require recessing floor inlet in concrete for floors with no under layment.
 - 3. Securing:
 - a. For floor inlets positioned on concrete floors with slope in excess of 5 degrees (approx 1:12), do not cut floor membrane for inlet until water is filled within 2’ (horizontal) of inlet to prevent wrinkles from forming near floor inlet.
 - b. For floor inlets in line with floor membrane seams, install PVC membrane ring having a minimum radius of 62mm (2-1/2”) greater than the inlet flange radius (flange diameter +124mm [5”]) centered about floor inlet in conjunction with 3.8.C.3.a. Trim PVC floor membrane approximately 12mm (1/2”) greater than flange radius (flange diameter +25mm [1”). Weld approximately 50mm (2”) of floor membrane to top surface of PVC membrane ring. Liquid seal cut/exposed edges of PVC membrane according to section 3.04.C ‘Chemical Seals’.
 - c. Install all screws in inlet flange according to manufacturer’s recommendations regarding screw torque. Do not over-tighten.
 - 4. Install screws, cover plates, flanges, and gaskets immediately prior to pool commissioning.
- C. Bottom Drains
 - 1. Remove grille and install under-membrane drain sub-assembly (if supplied). Install temporary wood or other protective covering securely over drain.
 - 2. Install grounding according to applicable articles and governing codes.
 - 3. Set drain body flush with adjacent concrete.
 - 4. Temporarily remove bracing members located over drain flanges as required to facilitate drain plumbing pressure testing. Immediately re-install bracing members upon completion of testing.
 - 5. Install drain grilles immediately prior to pool commissioning.

3.7 ERECTION AND LOCATION TOLERANCES

- A. Horizontal Line: Refer to Certification Requirements noted on Drawing Sheet #CP-1.
- B. Structure Elevation: Elevation of wall system below tile or coping shall remain within +/- 1/8” of required elevation to achieve finished pool water level.
- C. Finished Skim Elevation: Finished elevation of skimming tile or coping shall remain within +/- 3/32” of specified pool water level.

3.8 EQUIPMENT ACTIVATION

- A. All water chemistry and filtration mechanical equipment shall be operational upon filling of pool. Chemicals and other related support items as supplied by Contractor, shall be in supply at start-up.
- B. For the first fourteen (14) calendar days after completion of filling the pool, brush all pool surface surfaces at least twice a day and coordinate with General Contractor to ensure that the plaster is carefully maintained after the initial fourteen-day period. In addition, coordinate with the Contractor to ensure that pool filtration equipment is continuously running during the initial fourteen-day period.
- C. Start-up and provide qualified personnel to operate pool equipment for a period not less than fourteen (14) days after the pool is placed in operation, or until the Owner takes occupancy of the facility or letter of substantial completion. During this time, Contractor shall instruct and supervise the Owner's personnel in the various operating and maintenance techniques involved. Contractor shall be responsible for supply of chemicals during this not less than fourteen (14) day period and at time of turnover to Owner, chemical storage tanks shall be full. (Owner's personnel shall be fully trained and capable of assuming swimming pool maintenance tasks, training may begin before Owner takes occupancy).

3.9 CLEAN-UP

- A. Upon completion of swimming pool installation, remove all materials, equipment and debris occasioned by this Work and leave the job site in a clean and presentable condition. Perform all such clean-up to the approval of the Owner's Representative

END OF SECTION

SECTION 13 11 10 - SWIMMING POOL WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Furnish all labor, materials, tools and equipment as necessary to perform Cement Waterproofing on new and existing structures as shown on drawings and as specified in this section.

B. Related Sections:

1. Division 13, Section 13 11 02 "Swimming Pool Concrete."

1.2 QUALITY ASSURANCE

A. Qualifications of Workers:

1. The entity performing the work of this Section shall have been successfully engaged in the respective trade for at least five (5) years immediately prior to commencement of the Work.
2. For actual construction operations, use only trained and experienced workers with a minimum of three (3) years experience with the materials and methods specified.
3. Provide at least one person who shall be present at all times during execution of the work of this Section, with a minimum of five (5) years experience with the type of materials being installed, the referenced standards, and who shall direct all Work performed under this Section.

B. Standards:

1. ASTM C 39/C 39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
2. ASTM C 109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars.
3. ASTM C 267 - Standard Test Methods for Chemical Resistance of Mortars, Grouts, and Monolithic Surfacing and Polymer Concretes.
4. ASTM C 321 - Standard Test Method for Bond Strength of Chemical-Resistant Mortars.
5. ASTM C 348 - Standard Test Method for Flexural Strength of Hydraulic Cement Mortars.
6. ASTM E 96 - Standard Test Method for Water Vapor Transmission of Materials.
7. ASTM E 329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
8. COE CRD-C 48 - Standard Test Method for Water Permeability of Concrete.
9. NSF 61 - Drinking Water System Components - Health Effects.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01 40 00

- B. Product Data: Manufacturer's printed data sheet, for specified products.
- C. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - 1. Testing Agency: Independent laboratory meeting the requirements of ASTM E 329 and certified by the United States Bureau of Standards.
- D. Certificates: Product certificates signed by manufacturer certifying that:
 - 1. Materials comply with specified performance characteristics and physical requirements.
 - 2. Installer is qualified and approved by manufacturer.
- E. Manufacturer's installation instructions.
- F. Manufacturer's report on field inspection of substrates, prior to installation.
- G. Executed warranties.

1.4 PRODUCT HANDLING

- A. Deliver and store in a dry area between 40°F (5°C) and 90°F (32°C). Handle and protect from freezing and direct sun light in accordance with manufacturer's instructions.
- B. Deliver materials in manufacturer's unopened containers, fully identified with brand, type, grade, class and all other qualifying information. Provide Material Safety Data Sheets for each product.
- C. Take necessary precautions to keep products clean, dry and free of damage.

1.5 SYSTEM REQUIREMENTS

- A. Coordinate waterproofing installation with other trades.
- B. Provide materials and accessories in timely manner so as not to delay Work.

1.6 PROJECT CONDITIONS

- A. Maintain surfaces to be waterproofed and surrounding air temperature at not less than 40°F (5°C). Apply only when temperatures are steady or rising.
- B. Do not apply materials to frozen or frost-filled surfaces.
- C. Exercise caution when temperatures exceed 90°F (32°C).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Approved Manufacturers:
1. Xypex Chemical Corporation; 13731 Mayfield Place, Richmond, BC V6V 2G9. ASD. Tel: (800) 961-4477 or (604) 273-5265. Fax: (604) 270-0451. E-mail: info@xypex.com. www.xypex.com.
 2. Miracote Miraflex Membrane C 3000 E. Harcourt St. Rancho Dominguez, CA 90221 Phone: (310) 631-6594, Fax: (310) 886-9119
 3. Hycrete, Inc.; 462 Barrell Ave, Carlstadt, NJ, 07072. Phone: (201) 386-8110. Fax: (201) 386-8155. www.hycrete.com
- B. Requests for substitutions will be considered only if submitted to the architect/engineer in writing and must include substantiation of product performance, 10 days prior to the original bid date.

2.2 MATERIALS

- A. Waterproofing Material - Acrylic Modified Cement Waterproofing: Cementitious, two-component, acrylic emulsion based, highly flexible, crack bridging waterproof membrane barrier against positive water pressure, with the following characteristics:
1. Product: Miracote Miraflex Membrane C r Xypex two coat crystalline waterproofing or Hycrete W500.
 2. Color: Gray
 3. Dry Component-A: Precise blend of cementitious material
 4. Liquid Component-B: White acrylic emulsion and admixtures
 5. Working Time: Approximately 45 minutes
 6. Shore A Hardness: > 90
 7. Bond/Adhesion: (ASTM C-321) 215 psi (1.5 MPa) @ 28 days
 8. Tear Resistance: 190 psi (1.3 MPa) at 68oF (20oC)
 9. Elongation: (%) 60 (gray); 40 (white) at 68oF (20oC)
 10. Elongation: (mils) 40 (gray); 25 (white)
 11. Crack bridging capacity: (inch) 1/16 (gray) (1.5 mm)
 12. Vapor Permeability: (US Perms) 1.2 (ASTM E-96)
 13. Waterproofing: (CRD C 48-92) Withstands 200 psi = 460 feet (14 bar = 140 m) hydrostatic pressure (positive side) at 3/32 (2.4 mm) thickness.
 14. Penetration: At least 2 inches (50 mm) penetration of crystal-forming material, evidenced by scanning electron microscope photographs.
 15. Chemical Resistance: No detrimental effects when tested using 4000 psi (27.6 MPa) compressive strength concrete in accordance with ASTM C 267 using hydrochloric acid (pH of 3.5), brake fluid, transformer oil, ethylene glycol, toluene, and caustic soda as test mediums for duration of 84 days each; minimum of 14 percent increase in concrete compressive strength when tested in accordance with ASTM C 39/C 39M.
 16. Potable Water Contact Approval: NSF certification for use on structures holding potable water, based on testing in accordance with NSF 61.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine all construction substrates and conditions under which waterproofing materials are to

be installed. Do not proceed with the waterproofing application until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. Protect adjacent surfaces not designated to receive waterproofing.
- B. Substrate preparation:
 - 1. Remove oil, grease, dirt, loose particles, remains of form oils, water repellents, rust or other coatings by high-pressure water blasting (>3000 psi), wet or dry sand blasting, or other mechanical means to produce surfaces suitable for application of waterproofing.
 - 2. Follow manufacturer's instructions to clean and prepare surfaces and seal cracks and joints.
 - 3. Voids in concrete substrates: 1/4-inch (6 mm) diameter and larger, pre-treat with a cementitious mortar. Less than 1/4-inch (6 mm) diameter can be filled with a scratch coat of two-component waterproofing material.
- C. Rinse surfaces to be waterproofed (excluding drywall or similar) with clean water to saturated surface dry (SSD) condition, with no standing water on horizontal surfaces.

3.3 INSTALLATION

- A. Mix two-component waterproofing material in proportions recommended by manufacturer.
- B. Taping:
 - 1. Apply two-component waterproofing material by brush in a six to seven inch (15 – 18 cm) wide strip coat centered over all joints, cracks, penetrations and changes of plane to be taped.
 - 2. While this coat is still wet, unroll joint sealing tape into the coating and apply a coat of two-component waterproofing material over the tape, smoothing out wrinkles and fish mouths.
- C. Positive Side Waterproofing:
 - 1. Apply two-component waterproofing material in quantities as per manufacturer's specifications and recommendations:
 - a. Apply at 60 mils or 1/16" (1.5 mm) total thickness for water levels up to 2-feet (0.60 m).
 - b. Apply at 90 mils (2.4 mm) total thickness for water depth greater than 2-feet (>0.60 m).
- D. Application considerations:
 - 1. Apply, using stainless steel trowel, tampico brush, short nap roller, or appropriate compressed-air spray equipment.
 - 2. If needed, such as in zones posed to movement or cracking, plaza decks, the waterproofing material can be additionally reinforced with a reinforcing mesh (supplied by waterproofing manufacturer), embedded between two waterproofing layers.
 - 3. Apply only when surface and ambient temperatures are 40oF (5oC) and rising. At high temperatures i.e. 86oF (30oC) and above) protect application from direct sun and wind to prevent premature surface drying and shrinkage cracks. Apply material in two coats minimum.

4. Application thickness should not exceed 1/8-inch (120 mils (3 mm)).
5. Do not bridge cracks greater than 1/16-inch (1.5 mm).
6. Bridge dynamic cracks or joints with elastomeric joint sealing tape, as supplied by waterproofing manufacturer.
7. Do not overcoat waterproofing material with solvent-based materials.
8. Prime and protect alkali sensitive metals such as copper, aluminum, galvanized or zinc treated metal before over-coating with waterproofing material. Follow manufacturer's recommendations for primer material.

3.4 CURING

- A. Follow manufacturer's general instructions for curing and hardening of waterproofing material. Do not use water for curing. Waterproofing material is self-curing.
- B. Protect surfaces from rain, frost and premature dehydration.

3.5 ACCEPTANCE

- A. Remove left over materials and any foreign material resulting from the work from the site.
- B. Clean adjacent surfaces and materials occasioned by this Work to the approval of the Owner.

END OF SECTION

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SECTION 210517 - SLEEVES AND SLEEVE SEALS FOR FIRE-SUPPRESSION PIPING

GENERAL

RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

SUMMARY

Section Includes:

- Sleeves.
- Stack-sleeve fittings.
- Sleeve-seal systems.
- Sleeve-seal fittings.
- Grout.
- Silicone sealants.

ACTION SUBMITTALS

Product Data: For each type of product.

PRODUCTS

SLEEVES

Cast-Iron Pipe Sleeves: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop.

Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, with plain ends and integral welded waterstop collar.

Galvanized-Steel Sheet Sleeves: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

PVC Pipe Sleeves: ASTM D 1785, Schedule 40.

Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

STACK-SLEEVE FITTINGS

Description: Manufactured, galvanized cast-iron sleeve with integral clamping flange for use in waterproof floors and roofs. Include clamping ring, bolts, and nuts for membrane flashing.

Underdeck Clamp: Clamping ring with setscrews.

SLEEVE-SEAL SYSTEMS

Description:

Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

Designed to form a hydrostatic seal of 20 psig (137 kPa) minimum.

Sealing Elements: High-temperature-silicone interlocking links shaped to fit surface of pipe.

Include type and number required for pipe material and size.

Pressure Plates: Carbon steel.

Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, ASTM B 633 of length required to secure pressure plates to sealing elements.

SLEEVE-SEAL FITTINGS

Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall.

Plastic or rubber waterstop collar with center opening to match piping OD.

GROUT

Description: Nonshrink, for interior and exterior sealing openings in non-fire-rated walls or floors.

Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

Packaging: Premixed and factory packaged.

SILICONE SEALANTS

Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant, ASTM C 920, Type S, Grade NS, Class 25, Use NT.

Silicone, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT. Grade P Pourable (self-leveling) formulation is for opening in floors and other horizontal surfaces that are not fire rated.

Silicone Foam: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

EXECUTION

SLEEVE INSTALLATION

Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch (25-mm) annular clear space between piping and concrete slabs and walls.

Sleeves are not required for core-drilled holes.

Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves. Cut sleeves to length for mounting flush with both surfaces.

Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level.

Using grout or silicone sealant, seal space outside of sleeves in slabs and walls without sleeve-seal system.

Install sleeves for pipes passing through interior partitions.

Cut sleeves to length for mounting flush with both surfaces.

Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.

Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint.

Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping and fill materials specified in Section 078413 "Penetration Firestopping."

STACK-SLEEVE-FITTING INSTALLATION

Install stack-sleeve fittings in new slabs as slabs are constructed.

Install fittings that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.

Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 076200 "Sheet Metal Flashing and Trim."

Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level.

Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

Use silicone sealant to seal around the outside of stack-sleeve fittings.

Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of floors at pipe penetrations. Seal pipe penetrations with fire- or smoke-stop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

SLEEVE-SEAL-SYSTEM INSTALLATION

Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

SLEEVE-SEAL-FITTING INSTALLATION

Install sleeve-seal fittings in new walls and slabs as they are constructed.

Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

Secure nailing flanges to concrete forms.

Use grout or silicone sealant, to seal the space around outside of sleeve-seal fittings.

FIELD QUALITY CONTROL

Perform the following tests and inspections:

Leak Test: After allowing for a full cure, test sleeves and sleeve seals for leaks. Repair leaks and retest until no leaks exist.

Sleeves and sleeve seals will be considered defective if they do not pass tests and inspections.

Prepare test and inspection reports.

SLEEVE AND SLEEVE-SEAL SCHEDULE

Use sleeves and sleeve seals for the following piping-penetration applications:

Exterior Concrete Walls above Grade:

Piping Smaller Than NPS 6: Steel pipe sleeves.
Piping NPS 6 and Larger: Steel pipe sleeves.

Exterior Concrete Walls below Grade:

Piping Smaller Than NPS 6: Steel pipe sleeves with sleeve-seal system.

Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.

Piping NPS 6 and Larger: Steel pipe sleeves with sleeve-seal system.

Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.

Concrete Slabs-on-Grade:

Piping Smaller Than NPS 6: Steel pipe sleeves with sleeve-seal system.

Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.

Piping NPS 6 and Larger: Steel pipe sleeves with sleeve-seal system.

Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.

Concrete Slabs above Grade:

Piping Smaller Than NPS 6: Steel pipe sleeves.
Piping NPS 6 and Larger: Steel pipe sleeves.

Interior Partitions:

Piping Smaller Than NPS 6: Steel pipe sleeves.
Piping NPS 6 and Larger: Galvanized-steel sheet sleeves.

END OF SECTION 210517

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SECTION 210518 - ESCUTCHEONS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Escutcheons.
- 2. Floor plates.

1.3 DEFINITIONS

- A. Existing Piping to Remain: Existing piping that is not to be removed and that is not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- 1. BrassCraft Manufacturing Co.
- 2. Dearborn Brass
- 3. Jones Stephens Corp.
- 4. Kennedy Manufacturing Company
- 5. Mid-America Fittings, Inc.
- 6. ProFlo

2.2 ESCUTCHEONS

- A. One-Piece, Steel Type: With polished, chrome-plated finish and setscrew fastener.
- B. One-Piece, Stainless-Steel Type: With polished stainless-steel finish.
- C. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.

- D. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped steel with polished, chrome-plated finish and spring-clip fasteners.
- E. One-Piece, Stamped-Steel Type: With polished, chrome-plated finish and spring-clip fasteners.
- F. Split-Plate, Stamped-Steel Type: With polished, chrome-plated finish; concealed hinge; and spring-clip fasteners.

2.3 FLOOR PLATES

- A. Split Floor Plates: Steel with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep pattern.
 - b. Chrome-Plated Piping: One-piece steel or split-plate steel with polished, chrome-plated finish.
 - c. Insulated Piping: One-piece stamped steel or split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece stamped steel or split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
 - e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece stamped steel or split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
 - f. Bare Piping in Unfinished Service Spaces: One-piece stamped steel or split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
 - g. Bare Piping in Equipment Rooms: One-piece stamped steel or split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
 - 2. Escutcheons for Existing Piping to Remain:
 - a. Chrome-Plated Piping: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
 - b. Insulated Piping: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
 - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
 - d. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.

- e. Bare Piping in Unfinished Service Spaces: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
 - f. Bare Piping in Equipment Rooms: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
- C. Install floor plates for piping penetrations of equipment-room floors.
- D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
- 1. New Piping: One-piece, floor plate.
 - 2. Existing Piping: Split floor plate.

3.2 FIELD QUALITY CONTROL

- A. Using new materials, replace broken and damaged escutcheons and floor plates.

END OF SECTION 210518

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SECTION 210523 - GENERAL-DUTY VALVES FOR FIRE PROTECTION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Two-piece ball valves with indicators.
 - 2. Bronze butterfly valves with indicators.
 - 3. Iron butterfly valves with indicators.
 - 4. Check valves.
 - 5. Bronze OS&Y gate valves.
 - 6. Iron OS&Y gate valves.
 - 7. NRS gate valves.
 - 8. Indicator posts.
 - 9. Trim and drain valves.

1.3 DEFINITIONS

- A. NRS: Nonrising stem.
- B. OS&Y: Outside screw and yoke.
- C. SBR: Styrene-butadiene rubber.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of valve.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, and weld ends.
 - 3. Set valves open to minimize exposure of functional surfaces.
- B. Use the following precautions during storage:

1. Maintain valve end protection.
 2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
- C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.
- D. Protect flanges and specialties from moisture and dirt.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

- A. UL Listed: Valves shall be listed for Fire Protection in UL's "Online Certifications Directory" under the headings listed below and shall bear UL mark:
1. Main Level: HAMV - Fire Main Equipment.
 - a. Level 1: HCBZ - Indicator Posts, Gate Valve.
 - b. Level 1: HLOT - Valves.
 - 1) Level 3: HLUG - Ball Valves, System Control.
 - 2) Level 3: HLXS - Butterfly Valves.
 - 3) Level 3: HMER - Check Valves.
 - 4) Level 3: HMRZ - Gate Valves.
 2. Main Level: VDGT - Sprinkler System & Water Spray System Devices.
 - a. Level 1: VQGU - Valves, Trim and Drain.
- B. FM Global Approved: Valves shall be listed in its "Approval Guide," under the headings listed below:
1. Automated Sprinkler Systems:
 - a. Indicator posts.
 - b. Valves.
 - 1) Gate valves.
 - 2) Check valves.
 - a) Single check valves.
 - 3) Miscellaneous valves.
- C. Source Limitations for Valves: Obtain valves for each valve type from single manufacturer.
- D. ASME Compliance:
1. ASME B16.1 for flanges on iron valves.

2. ASME B1.20.1 for threads for threaded-end valves.
 3. ASME B31.9 for building services piping valves.
- E. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.
- F. NFPA Compliance: Comply with NFPA 24 for valves.
- G. Valve Pressure Ratings: Not less than the minimum pressure rating indicated or higher as required by system pressures.
- H. Valve Sizes: Same as upstream piping unless otherwise indicated.
- I. Valve Actuator Types:
1. Worm-gear actuator with handwheel for quarter-turn valves, except for trim and drain valves.
 2. Handwheel: For other than quarter-turn trim and drain valves.
 3. Handlever: For quarter-turn trim and drain valves NPS 2 (DN 50) and smaller.

2.2 TWO-PIECE BALL VALVES WITH INDICATORS

- A. Manufacturers
- 1) Victaulic Co. of America.
 - 2) Nibco Inc.
- B. Description:
1. UL 1091, except with ball instead of disc and FM Global standard for indicating valves (butterfly or ball type), Class Number 1112.
 2. Minimum Pressure Rating: 175 psig (1200 kPa).
 3. Body Design: Two piece.
 4. Body Material: Forged brass or bronze.
 5. Port Size: Full or standard.
 6. Seats: PTFE.
 7. Stem: Bronze or stainless steel.
 8. Ball: Chrome-plated brass.
 9. Actuator: Worm gear or traveling nut.
 10. Supervisory Switch: Internal or external.
 11. End Connections for Valves NPS 1 (DN 25) through NPS 2 (DN 50): Threaded ends.
 12. End Connections for Valves NPS 2-1/2 (DN 65): Grooved ends.

2.3 BRONZE BUTTERFLY VALVES WITH INDICATORS

- A. Manufacturers
- 1) Milwaukee Valve Company
 - 2) Globe Fire Sprinkler Corp.
 - 3) Fivalco, Inc.

B. Description:

1. Standard: UL 1091 and FM Global standard for indicating valves, (butterfly or ball type), Class Number 1112.
2. Minimum: Pressure rating: 175 psig (1200 kPa).
3. Body Material: Bronze.
4. Seat Material: EPDM.
5. Stem Material: Bronze or stainless steel.
6. Disc: Bronze, Stainless steel, or with EPDM coating.
7. Actuator: Worm gear or traveling nut.
8. Supervisory Switch: Internal or external.
9. Ends Connections for Valves NPS 1 (DN 25) through NPS 2 (DN 50): Threaded ends.
10. Ends Connections for Valves NPS 2-1/2 (DN 65): Grooved ends.

2.4 IRON BUTTERFLY VALVES WITH INDICATORS

A. Manufacturers

- 1) Victaulic Co. of America.
- 2) Anvil International, Inc.
- 3) NIBCO Inc.
- 4) Globe Fire Sprinkler Corp.
- 5) Kennedy Valve Company
- 6) Tyco Fire Products LP
- 7) Fivalco Inc.
- 8) Zurn Industries, LLC

B. Description:

1. Standard: UL 1091 and FM Global standard for indicating valves, (butterfly or ball type), Class Number 112.
2. Minimum Pressure Rating: 175 psig (1200 kPa).
3. Body Material: Cast or ductile iron with nylon, EPDM, epoxy, or polyamide coating.
4. Seat Material: EPDM.
5. Stem: Stainless steel.
6. Disc: Ductile iron, nickel plated and EPDM or SBR coated.
7. Actuator: Worm gear or traveling nut.
8. Supervisory Switch: Internal or external.
9. Body Design: Grooved-end connections.

2.5 CHECK VALVES

A. Manufacturers

- 1) Victaulic Co. of America.
- 2) Viking Corporation
- 3) Anvil International, Inc.
- 4) NIBCO Inc.
- 5) Reliable Automatic Sprinkler Co., Inc
- 6) Globe Fire Sprinkler Corporation
- 7) Kennedy Valve Company

- 8) Tyco Fire Products LP
- 9) Fivalco Inc.
- 10) Zurn Industries, LLC

B. Description:

1. Standard: UL 312 and FM Global standard for swing check valves, Class Number 1210.
2. Minimum Pressure Rating: 175 psig (1200 kPa).
3. Type: Single swing check.
4. Body Material: Cast iron, ductile iron, or bronze.
5. Clapper: Bronze, ductile iron, or stainless steel.
6. Clapper Seat: Brass, bronze, or stainless steel.
7. Hinge Shaft: Bronze or stainless steel.
8. Hinge Spring: Stainless steel.
9. End Connections: Flanged, grooved, or threaded.

2.6 BRONZE OS&Y GATE VALVES

A. Manufacturers

- 1) Milwaukee Valve Company
- 2) NIBCO Inc.
- 3) United Brass Works, Inc.
- 4) Zurn Industries, LLC

B. Description:

1. Standard: UL 262 and FM Global standard for fire-service water control valves (OS&Y- and NRS-type gate valves).
2. Minimum Pressure Rating: 175 psig (1200 kPa).
3. Body and Bonnet Material: Bronze or brass.
4. Wedge: One-piece bronze or brass.
5. Wedge Seat: Bronze.
6. Stem: Bronze or brass.
7. Packing: Non-asbestos PTFE.
8. Supervisory Switch: External.
9. End Connections: Threaded.

2.7 IRON OS&Y GATE VALVES

A. Manufacturers

- 1) Victaulic Co. of America.
- 2) NIBCO Inc.
- 3) Kennedy Valve Company
- 4) WATTS
- 5) Mueller Co
- 6) Hammond Valve
- 7) American Cast Iron Pipe Company
- 8) Clow Valve Company
- 9) Zurn Industries, LLC

B. Description:

1. Standard: UL 262 and FM Global standard for fire-service water control valves (OS&Y- and NRS-type gate valves).
2. Minimum Pressure Rating: 175 psig (1200 kPa).
3. Body and Bonnet Material: Cast or ductile iron.
4. Wedge: Cast or ductile iron, or bronze.
5. Wedge Seat: Cast or ductile iron, or bronze.
6. Stem: Brass or bronze.
7. Packing: Non-asbestos PTFE.
8. Supervisory Switch: External.
9. End Connections: Flanged or Grooved.

2.8 NRS GATE VALVES

A. Manufacturers

- 1) Victaulic Co. of America.
- 2) NIBCO Inc.
- 3) Kennedy Valve Company
- 4) Mueller Co
- 5) American Cast Iron Pipe Company
- 6) Clow Valve Company
- 7) Zurn Industries, LLC

B. Description:

1. Standard: UL 262 and FM Global standard for fire-service water control valves (OS&Y- and NRS-type gate valves).
2. Minimum Pressure Rating: 175 psig (1200 kPa).
3. Body and Bonnet Material: Cast or ductile iron.
4. Wedge: Cast or ductile iron.
5. Wedge Seat: Cast or ductile iron, or bronze.
6. Stem: Brass or bronze.
7. Packing: Non-asbestos PTFE.
8. Supervisory Switch: External.
9. End Connections: Flanged or Grooved.

2.9 INDICATOR POSTS

A. Manufacturers

- 1) NIBCO Inc.
- 2) Kennedy Valve Company
- 3) Mueller Co
- 4) American Cast Iron Pipe Company
- 5) Clow Valve Company

B. Description:

1. Standard: UL 789 and FM Global standard for indicator posts.

2. Type: Underground, Pit or Wall.
3. Base Barrel Material: Cast or ductile iron.
4. Extension Barrel: Cast or ductile iron.
5. Cap: Cast or ductile iron.
6. Operation: Wrench.

2.10 TRIM AND DRAIN VALVES

A. Ball Valves:

1. Manufacturers
 - 1) Victaulic Co. of America.
 - 2) NIBCO Inc.
 - 3) Milwaukee Valve Company
 - 4) WATTS
 - 5) Potter Roemer LLC
 - 6) Tyco Fire Products LP
 - 7) Fire Protection Products, Inc
 - 8) Zurn Industries, LLC
 - 9) Fire-End & Croker Corporation
 - 10) Red White Valve Corp.
2. Description:
 - a. Pressure Rating: 175 psig (1200 kPa).
 - b. Body Design: Two piece.
 - c. Body Material: Forged brass or bronze.
 - d. Port size: Full or standard.
 - e. Seats: PTFE.
 - f. Stem: Bronze or stainless steel.
 - g. Ball: Chrome-plated brass.
 - h. Actuator: Handlever.
 - i. End Connections for Valves NPS 1 (DN 25) through NPS 2-1/2 (DN 65): Threaded or Grooved ends

B. Angle Valves:

1. Manufacturers
 - 1) NIBCO Inc.
 - 2) United Brass Works, Inc.
 - 3) Fire Protection Products, Inc
2. Description:
 - a. Pressure Rating: 175 psig (1200 kPa).
 - b. Body Material: Brass or bronze.
 - c. Ends: Threaded.
 - d. Stem: Bronze.
 - e. Disc: Bronze.
 - f. Packing: Asbestos free.
 - g. Handwheel: Malleable iron, bronze, or aluminum.

- C. Globe Valves:
 - 1. Manufacturers
 - 1) NIBCO Inc.
 - 2) United Brass Works, Inc
 - 2. Description:
 - a. Pressure Rating: 175 psig (1200 kPa).
 - b. Body Material: Bronze with integral seat and screw-in bonnet.
 - c. Ends: Threaded.
 - d. Stem: Bronze.
 - e. Disc Holder and Nut: Bronze.
 - f. Disc Seat: Nitrile.
 - g. Packing: Asbestos free.
 - h. Handwheel: Malleable iron, bronze, or aluminum.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.2 GENERAL REQUIREMENTS FOR VALVE INSTALLATION

- A. Comply with requirements in the following Sections for specific valve installation requirements and applications:
 - 1. Section 211100 "Facility Fire-Suppression Water-Service Piping" for application of valves in fire-suppression water-service piping outside the building.
 - 2. Section 211200 "Fire-Suppression Standpipes" for application of valves in fire-suppression standpipes.
 - 3. Section 211313 "Wet-Pipe Sprinkler Systems" for application of valves in wet-pipe, fire-suppression sprinkler systems.
 - 4. Section 211316 "Dry-Pipe Sprinkler Systems" for application of valves in dry-pipe, fire-suppression sprinkler systems.

5. Section 211339 "Foam-Water Systems" for application of valves in AFFF piping.
 - B. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
 - C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
 - D. Install valves having threaded connections with unions at each piece of equipment arranged to allow easy access, service, maintenance, and equipment removal without system shutdown. Provide separate support where necessary.
 - E. Install valves in horizontal piping with stem at or above the pipe center.
 - F. Install valves in position to allow full stem movement.
 - G. Install valve tags. Comply with requirements in Section 210553 "Identification for Fire-Suppression Piping and Equipment" for valve tags and schedules and signs on surfaces concealing valves; and the NFPA standard applying to the piping system in which valves are installed. Install permanent identification signs indicating the portion of system controlled by each valve.
 - H. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply except from fire-department connections.
 - I. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

END OF SECTION 210523

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SECTION 210529 - HANGERS AND SUPPORTS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal hanger-shield inserts.
5. Equipment supports.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Section 210516 "Expansion Fittings and Loops for Fire-Suppression Piping" for pipe guides and anchors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Equipment supports.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.
- B. Pipe Welding Qualifications: Qualify procedures and operators according to 2015 ASME Boiler and Pressure Vessel Code, Section IX.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Hangers and supports for fire-suppression piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
 - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
 - 3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.
- B. NFPA Compliance: Comply with NFPA 13.
- C. UL Compliance: Comply with UL 203.

2.2 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon-Steel Pipe Hangers and Supports:
 - 1. Description: Factory-fabricated components, NFPA approved, UL listed, or FM approved for fire-suppression piping support.
 - 2. Galvanized Metallic Coatings: Pregalvanized or hot-dip galvanized.
 - 3. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel or stainless steel.
- B. Copper Pipe and Tube Hangers:
 - 1. Description: Copper-coated-steel, factory-fabricated components, NFPA approved, UL listed, or FM approved for fire-suppression piping support.
 - 2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.3 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly, made from structural-carbon-steel shapes, with NFPA-approved, UL-listed, or FM-approved carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

- A. MFMA Manufacturer Metal Framing Systems:
1. Manufacturers:
 - a. Unitstrut
 - b. B-Line
 - c. Flex-Strut Inc.
 - d. G-Strut
 - e. Haydon Corporation
 - f. Thomas & Betts Corporation
 - g. Wesanco, Inc
 2. Description: Shop- or field-fabricated pipe-support assembly, made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
 3. Standard: Comply with MFMA-4, factory-fabricated components for field assembly.
 4. Channels: Continuous slotted carbon-steel channel with inturned lips.
 5. Channel Width: Selected for applicable load criteria.
 6. Channel Nuts: Formed or stamped nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
 7. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
- B. Non-MFMA Manufacturer Metal Framing Systems:
1. Manufacturers:
 - a. Anvil International
 - b. Carpenter & Paterson, Inc
 - c. Empire Industries, Inc
 - d. ERICO International Corporation
 - e. PHD Manufacturing, Inc
 2. Description: Shop- or field-fabricated pipe-support assembly, made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
 3. Standard: Comply with MFMA-4, factory-fabricated components for field assembly.
 4. Channels: Continuous slotted carbon-steel channel with inturned lips.
 5. Channel Width: Select for applicable load criteria.
 6. Channel Nuts: Formed or stamped nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
 7. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

2.5 THERMAL HANGER-SHIELD INSERTS

- A. Manufacturers:
- a. Carpenter & Paterson, Inc
 - b. Clement Support Services
 - c. ERICO International Corporation
 - d. National Pipe Hanger Corporation
 - e. Pipe Shields Inc.
 - f. Piping Technology & Products, Inc
 - g. Rilco Manufacturing Co., Inc
 - h. Value Engineered Products, Inc
- B. Insulation-Insert Material: Water-repellent-treated, ASTM C 533, Type I calcium silicate with 100-psi (688-kPa) minimum compressive strength.

- C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- E. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

2.6 EQUIPMENT SUPPORTS

- A. Description: NFPA-approved, UL-listed, or FM-approved, welded, shop- or field-fabricated equipment support, made from structural-carbon-steel shapes.

2.7 MATERIALS

- A. Aluminum: ASTM B 221 (ASTM B 221M).
- B. Carbon Steel: ASTM A 1011/A 1011M.
- C. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
- D. Stainless Steel: ASTM A 240/A 240M.
- E. Grout: ASTM C 1107/C 1107M, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout, suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Strength of Support Assemblies: Where not indicated, select sizes of components, so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

3.2 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with installation requirements of approvals and listings. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller-diameter pipes as specified for individual pipe hangers.
 2. Field fabricate from ASTM A 36/A 36M carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal strut systems.
- D. Thermal Hanger-Shield Installation: Install in pipe hanger or shield for insulated piping.
- E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- F. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- H. Install lateral bracing with pipe hangers and supports to prevent swaying.
- I. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- J. Load Distribution: Install hangers and supports, so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- K. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- L. Insulated Piping:
1. Attach clamps and spacers to piping.
 - a. Piping Operating Above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating Below Ambient Air Temperature: Use thermal hanger-shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 2. Install MSS SP-58, Type 39 protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
 3. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

- a. Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
 - b. NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
 - c. NPS 5 and NPS 6 (DN 125 and DN 150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
 - d. NPS 8 to NPS 14 (DN 200 to DN 350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.
 - e. NPS 16 to NPS 24 (DN 400 to DN 600): 24 inches (610 mm) long and 0.105 inch (2.67 mm) thick.
5. Pipes NPS 8 (DN 200) and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal Hanger Shields: Install with insulation of same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. Finish welds at exposed connections, so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches (40 mm).

3.6 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with NFPA requirements for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finishes.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports and attachments for general service applications.
- F. Use stainless-steel pipe hangers and stainless-steel attachments for hostile environment applications.
- G. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.
- H. Use thermal hanger-shield inserts for insulated piping and tubing.
- I. Horizontal-Piping Hangers and Supports: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
 - 2. Steel Pipe Clamps (MSS Type 4): For suspension of NPS 1/2 to NPS 24 (DN 15 to DN 600) if little or no insulation is required.
 - 3. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
 - 4. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8 (DN 10 to DN 200).
 - 5. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3 (DN 10 to DN 80).
 - 6. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
 - 7. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.

8. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
 9. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 (DN 65 to DN 900) if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
- J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24 (DN 24 to DN 600).
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 (DN 20 to DN 600) if longer ends are required for riser clamps.
- K. Hanger-Rod Attachments: Comply with NFPA requirements.
- L. Building Attachments: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable-Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. C-Clamps (MSS Type 23): For structural shapes.
 3. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
- M. Saddles and Shields: Comply with NFPA requirements. Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 3. Thermal Hanger-Shield Inserts: For supporting insulated pipe.
- N. Comply with NFPA requirements for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- O. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
- P. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 210529

SECTION 21 05 48 - VIBRATION AND SEISMIC CONTROLS FOR FIRE-SUPPRESSION PIPING
AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Elastomeric isolation pads.
 - 2. Elastomeric isolation mounts.
 - 3. Restrained elastomeric isolation mounts.
 - 4. Pipe-riser resilient supports.
 - 5. Resilient pipe guides.
 - 6. Elastomeric hangers.
 - 7. Snubbers.
 - 8. Restraint channel bracings.
 - 9. Seismic-restraint accessories.
 - 10. Mechanical anchor bolts.
 - 11. Adhesive anchor bolts.

1.3 DEFINITIONS

- A. IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.
- C. OSHPD: Office of Statewide Health Planning & Development for the State of California.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
 - 2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of vibration isolation device and seismic-restraint component required.
 - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.

- b. Annotate to indicate application of each product submitted and compliance with requirements.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show coordination of vibration isolation device installation and seismic bracing for fire-suppression piping and equipment with other systems and equipment in the vicinity, including other supports and restraints, if any.
- B. Qualification Data: NICET Water-based Systems Layout III.
- C. Welding certificates.
- D. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPM number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are unavailable, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic-Restraint Loading:
 - 1. Assigned Seismic Use Group or Building Category as Defined in the CBC: III.
 - a. Component Importance Factor: 1.5.
 - b. Component Response Modification Factor: 5.0.
 - c. Component Amplification Factor: 3.5.
 - 2. Design Spectral Response Acceleration at Short Periods (0.2 Second): 0.605
 - 3. Design Spectral Response Acceleration at 1.0-Second Period: 0.462
 - 4. Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.

- a. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they are subjected.

2.2 SEISMIC-RESTRAINT ACCESSORIES

Through bolts with proper blocking

- A. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to rigid channel bracings.
- B. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

- A. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength is adequate to carry present and future static and seismic loads within specified loading limits.

3.3 VIBRATION CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 "Cast-in-Place Concrete."
- B. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.
- C. Piping Restraints:
 1. Comply with requirements in MSS SP-127.
 2. Space lateral supports a maximum of 40 feet (12 m)o.c., and longitudinal supports a maximum of 80 feet (24 m)o.c.
 3. Brace a change of direction longer than 12 feet (3.7 m).

- D. Install seismic-restraint devices using methods approved by **an agency acceptable to authorities having jurisdiction** that provides required submittals for component.
- E. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
- F. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
- G. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- H. Drilled-in Anchors:
 - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - 2. Set through bolts to manufacturer's recommended torque, using a torque wrench.
 - 3. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in "Section 211313 "Wet-Pipe Sprinkler Systems,".

END OF SECTION 210548

SECTION 210553 - IDENTIFICATION FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Warning signs and labels.
 - 3. Pipe labels.
 - 4. Stencils.
 - 5. Valve tags.
 - 6. Warning tags.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment-Label Schedule: Include a listing of all equipment to be labeled and the proposed content for each label.
- D. Valve Schedules: Valve numbering scheme.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Metal Labels for Equipment:
 - 1. Manufactures
 - a. Brady Corporation
 - b. Brimar Industries, Inc
 - c. Carlton Industries, LP
 - d. Champion America
 - e. Craftmark Pipe Markers
 - f. Emedco

- g. Kolbi Pipe Marker Co.
 - h. LEM Products Inc.
 - i. Marking Services, Inc
 - j. Seton Identification Products
2. Material and Thickness: Brass, 0.032 inch (0.8 mm), stainless steel, 0.025 inch (0.64 mm), aluminum, 0.032 inch (0.8 mm), or anodized aluminum, 0.032 inch (0.8 mm) thick, with predrilled holes for attachment hardware.
 3. Letter Color: Red
 4. Background Color: White
 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
 6. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 7. Fasteners: Stainless-steel rivets or self-tapping screws.
 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Plastic Labels for Equipment:
1. Manufactures
 - a. Brady Corporation
 - b. Brimar Industries, Inc
 - c. Carlton Industries, LP
 - d. Champion America
 - e. Craftmark Pipe Markers
 - f. Emedco
 - g. Kolbi Pipe Marker Co.
 - h. LEM Products Inc.
 - i. Marking Services, Inc
 - j. Seton Identification Products
 2. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch (1.6 mm) or 1/8 inch (3.2 mm) thick, with predrilled holes for attachment hardware.
 3. Letter Color: Red
 4. Background Color: White
 5. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
 6. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
 7. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 8. Fasteners: Stainless-steel rivets or self-tapping screws.
 9. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

- D. Equipment-Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch (A4) bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Manufactures

1. Brady Corporation
2. Brimar Industries, Inc
3. Carlton Industries, LP
4. Champion America
5. Craftmark Pipe Markers
6. Emedco
7. LEM Products Inc.
8. Marking Services, Inc
9. National Marker Company
10. Seton Identification Products
11. Stranco, Inc.

- B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch (1.6 mm) 1/8 inch (3.2 mm) thick, with predrilled holes for attachment hardware.

- C. Letter Color: Red

- D. Background Color: White

- E. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).

- F. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).

- G. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

- H. Fasteners: Stainless-steel rivets or self-tapping screws.

- I. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

- J. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. Manufactures

1. Actioncraft Products, Inc.

2. Brady Corporation
3. Brimar Industries, Inc
4. Carlton Industries, LP
5. Champion America
6. Craftmark Pipe Markers
7. Emedco
8. Kolbi Pipe Marker Co.
9. LEM Products Inc.
10. Marking Services, Inc
11. Seton Identification Products

- B. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service and showing flow direction according to ASME A13.1.
- C. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.
- D. Self-adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- E. Pipe-Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
 1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
 2. Lettering Size: Size letters according to ASME A13.1 for piping.
- F. Pipe-Label Colors:
 1. Background Color: Safety Red.
 2. Letter Color: White.

2.4 STENCILS

- A. Stencils for Piping:
 1. Manufactures
 - a. Brimar Industries, Inc
 - b. Carlton Industries, LP
 - c. Champion America
 - d. Craftmark Pipe Markers
 - e. Kolbi Pipe Marker Co.
 - f. Marking Services, Inc
 2. Lettering Size: Size letters according to ASME A13.1 for piping.
 3. Stencil Material: Aluminum, Brass, Fiberboard, or Metal.
 4. Stencil Paint: Safety Red, exterior, gloss, acrylic enamel. Paint may be in pressurized spray-can form.
 5. Identification Paint: White, exterior, acrylic enamel. Paint may be in pressurized spray-can form.

2.5 VALVE TAGS

- A. Manufactures
 - a. Actioncraft Products, Inc
 - b. Brady Corporation
 - c. Brimar Industries, Inc
 - d. Carlton Industries, LP
 - e. Champion America
 - f. Craftmark Pipe Markers
 - g. Emedco
 - h. Kolbi Pipe Marker Co.
 - i. LEM Products Inc.
 - j. Marking Services, Inc
 - k. Seton Identification Products

- B. Description: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping-system abbreviation and 1/2-inch (13-mm) numbers.
 - 1. Tag Material: Brass, 0.032 inch (0.8 mm) or stainless steel, 0.025 inch (0.64 mm) thick, with predrilled holes for attachment hardware.
 - 2. Fasteners: Brass or Steel wire-link chain or S-hook.
 - 3. Valve-Tag Color: Safety Red.
 - 4. Letter Color: White.

- C. Valve Schedules: For each piping system, on 8-1/2-by-11-inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1. Valve-tag schedule shall be included in operation and maintenance data.

2.6 WARNING TAGS

- 1. Manufactures
 - a. Brady Corporation
 - b. Brimar Industries, Inc
 - c. Carlton Industries, LP
 - d. Champion America
 - e. Craftmark Pipe Markers
 - f. Emedco
 - g. Kolbi Pipe Marker Co.
 - h. LEM Products Inc.
 - i. Marking Services, Inc
 - j. Seton Identification Products

- B. Description: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
 - 1. Size: Approximately 4 by 7 inches (100 by 178 mm).
 - 2. Fasteners: Brass grommet and wire.

3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Safety Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean piping and equipment surfaces of incompatible primers, paints, and encapsulants, as well as dirt, oil, grease, release agents, and other substances that could impair bond of identification devices.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be installed.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

- A. Piping: Painting of piping is specified in Section 099123 "Interior Painting."
- B. Stenciled Pipe-Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels, complying with ASME A13.1, on each piping system.
 1. Identification Paint: Use for contrasting background.
 2. Stencil Paint: Use for pipe marking.
- C. Pipe-Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 1. Near each valve and control device.
 2. Near each branch connection excluding short takeoffs. Where flow pattern is not obvious, mark each pipe at branch.
 3. Near penetrations and on through walls, floors, ceilings, and inaccessible enclosures.

4. At access doors, manholes, and similar access points that permit a view of concealed piping.
 5. Near major equipment items and other points of origination and termination.
 6. Spaced at maximum intervals of 50 feet (15 m) along each run. Reduce intervals to 25 feet (7.6 m) in areas of congested piping and equipment.
 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- D. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes including pipes where flow is allowed in both directions.

3.5 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in fire-suppression piping systems. List tagged valves in a valve-tag schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and with captions similar to those indicated in "Valve-Tag Size and Shape" Subparagraph below:
 1. Valve-Tag Size and Shape:
 - a. Fire-Suppression Standpipe: 1-1/2 inches (38 mm), round.
 - b. Wet-Pipe Sprinkler System: 1-1/2 inches (38 mm), round.
 - c. Dry-Pipe Sprinkler System: 1-1/2 inches (38 mm), round.
 - d. Foam-Water System: 1-1/2 inches (38 mm), round.
 - e. Clean-Agent Fire-Extinguishing System: 1-1/2 inches (38 mm), round.

3.6 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 210553

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SECTION 211100 - FACILITY FIRE-SUPPRESSION WATER-SERVICE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes fire-suppression water-service piping and related components outside the building and the following:
 - 1. Pipes, fittings, and specialties.
 - 2. Fire-suppression specialty valves.
 - 3. Concrete vaults.
 - 4. Protective enclosures.
 - 5. Alarm devices.
- B. Utility-furnished products include water meters that are furnished to the site, ready for installation.
- C. Related Requirements:
 - 1. Section 211119 "Fire-Department Connections" for exposed-, flush-, and yard-type, fire-department connections.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.
 - 2. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.
- B. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Comply with requirements of utility company supplying the water. Include tapping of water mains and backflow prevention.
 - 2. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Comply with FM Global's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
- E. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-suppression water-service piping.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
 - 1. Ensure that valves are dry and internally protected against rust and corrosion.
 - 2. Protect valves against damage to threaded ends and flange faces.
 - 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
 - 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
 - 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

PART 2 - PRODUCTS

2.1 DUCTILE-IRON PIPE AND FITTINGS

- A. Grooved-Joint, Ductile-Iron Pipe: AWWA C151, with cut, rounded-grooved ends.
- B. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end.
- C. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end.
- D. Grooved-End, Ductile-Iron Pipe Appurtenances:
 - 1. Grooved-End, Ductile-Iron Fittings: ASTM A 47/A 47M, malleable-iron castings or ASTM A 536, ductile-iron castings with dimensions matching pipe.
 - 2. Grooved-End, Ductile-Iron-Piping Couplings: AWWA C606, for ductile-iron-pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.
- E. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - 1. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- F. Push-on-Joint, Ductile-Iron Fittings: AWWA C153, ductile-iron compact pattern.
 - 1. Gaskets: AWWA C111, rubber.
- G. Flanges: ASME B16.1, Class 125, cast iron.

2.2 PVC PIPE AND FITTINGS

- A. PVC Pipe: AWWA C900, Class 150, with bell end with gasket, and with spigot end.
- B. PVC Fittings: AWWA C900, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.

2.3 JOINING MATERIALS

- A. Gaskets for Ferrous Piping and Copper-Alloy Tubing: ASME B16.21, asbestos free.
- B. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series.
- C. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.

2.4 PIPING SPECIALTIES

- A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
- B. Tubular-Sleeve Pipe Couplings:
 - 1. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners, and with ends of same sizes as piping to be joined.
 - 2. Standard: AWWA C219.
 - 3. Center-Sleeve Material: Manufacturer's standard
 - 4. Gasket Material: Natural or synthetic rubber.
 - 5. Pressure Rating: 150 psig (1035 kPa) minimum.
 - 6. Metal Component Finish: Corrosion-resistant coating or material.

2.5 CORPORATION VALVES

- A. Corporation Valves: Comply with AWWA C800. Include saddle and valve compatible with tapping machine.
 - 1. Service Saddle: Copper alloy with seal and AWWA C800, threaded outlet for corporation valve.
 - 2. Corporation Valve: Bronze body and ground-key plug, with AWWA C800, threaded inlet and outlet matching service piping material.
 - 3. Manifold: Copper fitting with two to four inlets as required, with ends matching corporation valves and outlet matching service piping material.
- B. Meter Valves: Comply with AWWA C800 for high-pressure, service-line valves. Include angle- or straight-through-pattern bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.

2.6 CURB VALVES

- A. Curb Valves: Comply with AWWA C800 for high-pressure, service-line valves. Valve has bronze body, ground-key plug or ball, wide tee head, and inlet and outlet matching service piping material.
- B. Service Boxes for Curb Valves: Similar to AWWA M44 requirements for cast-iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over curb valve and with a barrel approximately 3 inches (75 mm) in diameter.
 - 1. Shutoff Rods: Steel; with tee-handle with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve.
- C. Meter Valves: Comply with AWWA C800 for high-pressure, service-line valves. Include angle- or straight-through-pattern bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.

2.7 BACKFLOW PREVENTERS

- A. Double-Check, Detector-Assembly Backflow Preventers:
1. Febco by Watts
 2. Standards: ASSE 1048 and UL's "Fire Protection Equipment Directory" listing
 3. Operation: Continuous-pressure applications.
 4. Pressure Loss: 5 psig (35 kPa) maximum, through middle one-third of flow range.
 5. Size: 4" NPS.
 6. Design Flow Rate: 475 gpm.
 7. Pressure Loss at Design Flow Rate: 5 psig.
 8. Body Material: Ductile iron with Stainless Steel check components
 9. End Connections: Flanged.
 10. Configuration: Designed for straight through flow.
 11. Accessories:
 - a. Valves: UL 262 and FM Global's "Approval Guide" listing; OS&Y gate type with flanged ends on inlet and outlet.
 - b. Bypass: With displacement-type water meter, shutoff valves, and reduced-pressure backflow preventer.

2.8 ALARM DEVICES

- A. General: UL 753 and FM Global's "Approval Guide" listing, of types and sizes to mate and match piping and equipment.
- B. Water-Flow Indicators: Vane-type water-flow detector, rated for 250-psig (1725-kPa) working pressure; designed for horizontal or vertical installation; with two single-pole, double-throw circuit switches to provide isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal when cover is removed.
- C. Supervisory Switches: Single pole, double throw; designed to signal valve in other than fully open position.
- D. Pressure Switches: Single pole, double throw; designed to signal increase in pressure.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Comply with excavating, trenching, and backfilling requirements in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

- A. Water-Main Connection: Arrange with water utility company for tap of size and in location indicated in water main.
- B. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.
- C. Make connections larger than NPS 2 (DN 50) with tapping machine according to the following:
 - 1. Install tapping sleeve and tapping valve according to MSS SP-60.
 - 2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
 - 3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
 - 4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
- D. Comply with NFPA 24 for fire-service-main piping materials and installation.
- E. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
 - 1. Install encasement for piping according to ASTM A 674 or AWWA C105.
- F. Install PVC, AWWA pipe according to ASTM F 645 and AWWA M23.
- G. Bury piping with depth of cover over top at least 30 inches (750 mm), with top at least 12 inches (300 mm) below level of maximum frost penetration, and according to the following:
 - 1. Under Driveways: With at least 36 inches (910 mm) of cover over top.
 - 2. In Loose Gravelly Soil and Rock: With at least 12 inches (300 mm)
- H. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- I. Extend fire-suppression water-service piping and connect to water-supply source and building fire-suppression water-service piping systems at locations and pipe sizes indicated.
 - 1. Terminate fire-suppression water-service piping within the building at 1'-0" above the floor slab. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building's fire-suppression water-service piping systems when those systems are installed.
- J. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.
- K. Comply with requirements for fire-suppression water-service piping inside the building in the following Sections:
 - 1. Section 211313 "Wet-Pipe Sprinkler Systems"

- L. Comply with requirements in Section 221116 "Domestic Water Piping" for potable-water piping inside the building.
- M. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- N. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

3.3 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure rating same as or higher than systems pressure rating for aboveground applications unless otherwise indicated.
- B. Install flanges, flange adaptors, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.
- C. Ream ends of tubes and remove burrs.
- D. Remove scale, slag, dirt, and debris from outside and inside of pipes, tubes, and fittings before assembly.
- E. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
- F. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts.
- G. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with bolts according to ASME B31.9.
- H. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139.
- I. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure.
- J. Do not use flanges or unions for underground piping.

3.4 ANCHORAGE INSTALLATION

- A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:
 - 1. Concrete thrust blocks.
 - 2. Locking mechanical joints.
 - 3. Set-screw mechanical retainer glands.
 - 4. Bolted flanged joints.

5. Heat-fused joints.
 6. Pipe clamps and tie rods.
- B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches in fire-suppression water-service piping according to NFPA 24 and the following:
1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
 2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
 3. Bonded-Joint Fiberglass, Water-Service Piping: According to AWWA M45.
- C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.5 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
- B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.
- C. UL-Listed or FM Global-Approved Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.
- D. UL-Listed or FM Global-Approved Valves Other Than Gate Valves: Comply with NFPA 24.
- E. Support valves and piping, not direct buried, on concrete piers. Comply with requirements for concrete piers in Section 033000 "Cast-in-Place Concrete."

3.6 DETECTOR CHECK VALVE INSTALLATION

- A. Install in vault or aboveground.
- B. Install for proper direction of flow. Install bypass with water meter, gate valves on each side of meter, and check valve downstream from meter.
- C. Support detector check valves and piping on concrete piers. Comply with requirements for concrete piers in Section 033000 "Cast-in-Place Concrete."

3.7 BACKFLOW PREVENTER INSTALLATION

- A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
- B. Do not install backflow preventers that have relief drain in vault or in other spaces subject to flooding.
- C. Do not install bypass piping around backflow preventers.

- D. Support NPS 2-1/2 (DN 65) and larger backflow preventers and piping on concrete piers. Comply with requirements for concrete piers in Section 033000 "Cast-in-Place Concrete."

3.8 FIRE-DEPARTMENT CONNECTION INSTALLATION

- A. Install ball drip valves at each check valve for fire-department connection to mains.
- B. Install protective pipe bollards on two sides of each freestanding fire-department connection.

3.9 ALARM DEVICE INSTALLATION

- A. General: Comply with NFPA 24 for devices and methods of valve supervision. Underground valves with valve box do not require supervision.
- B. Supervisory Switches: Supervise valves in open position.
 - 1. Valves: Grind away portion of exposed valve stem. Bolt switch, with plunger in stem depression, to OS&Y gate-valve yoke.
 - 2. Indicator Posts: Drill and thread hole in upper-barrel section at target plate. Install switch, with toggle against target plate, on barrel of indicator post.
- C. Locking and Sealing: Secure unsupervised valves as follows:
 - 1. Valves: Install chain and padlock on open OS&Y gate valve.
 - 2. Post Indicators: Install padlock on wrench on indicator post.
- D. Pressure Switches: Drill and thread hole in exposed barrel of fire hydrant. Install switch.
- E. Water-Flow Indicators: Install in water-service piping in vault. Select indicator with saddle and vane matching pipe size. Drill hole in pipe, insert vane, and bolt saddle to pipe.
- F. Connect alarm devices to building's fire-alarm system. Wiring and fire-alarm devices are specified in Section 284621.11 "Addressable Fire-Alarm Systems."

3.10 CONNECTIONS

- A. Connect fire-suppression water-service piping to existing water main.

3.11 FIELD QUALITY CONTROL

- A. Use test procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described below.
- B. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

- C. Hydrostatic Tests: Test at not less than one-and-one-half times the working pressure for two hours.
 - 1. Increase pressure in 50-psig (350-kPa) increments and inspect each joint between increments. Hold at test pressure for one hour; decrease to zero psig (zero kPa). Slowly increase again to test pressure and hold for one more hour. Maximum allowable leakage is 2 quarts (1.89 L) per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
- D. Prepare test and inspection reports.

3.12 IDENTIFICATION

- A. Install continuous underground detectable warning tape during backfilling of trench for underground fire-suppression water-service piping. Locate below finished grade, directly over piping.
- B. Permanently attach equipment nameplate or marker indicating plastic fire-suppression water-service piping or fire-suppression water-service piping with electrically insulated fittings, on main electrical meter panel. Comply with requirements for identifying devices in Section 220553 "Identification for Plumbing Piping and Equipment."

3.13 CLEANING

- A. Clean and disinfect fire-suppression water-service piping as follows:
 - 1. Purge new piping systems and parts of existing systems that have been altered, extended, or repaired before use.
 - 2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
 - 3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
 - a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow it to stand for 24 hours.
 - b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow it to stand for three hours.
 - c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- B. Prepare reports of purging and disinfecting activities.

3.14 PIPING SCHEDULE

- A. Underground fire-suppression water-service piping NPS 4 (DN 100) shall be one of the following:
 - 1. Mechanical-joint, ductile-iron pipe; mechanical-joint, ductile- or gray-iron, standard-pattern fittings; glands, gaskets, and bolts; and gasketed joints. (Connections to hydrants and FDC)
 - 2. PVC, Class 150 pipe listed for fire-protection service; PVC fittings of same class as pipe; and gasketed joints. (All piping not supplying hydrants or FDC)
- B. Aboveground fire-suppression water-service piping NPS 4 shall be the following:
 - 1. Grooved-end, ductile-iron pipe; grooved-end, ductile-iron pipe appurtenances; and grooved joints.

3.15 VALVE SCHEDULE

- A. Underground fire-suppression water-service shutoff valves NPS 4 (DN 80) and larger shall be the following:
 - 1. 200-psig (1380-kPa), AWWA, iron, nonrising-stem, metal seated gate valves.
- B. Indicator-post underground fire-suppression water-service valves NPS 4 (DN 80) and larger shall be 175-psig (1200-kPa), UL-listed or FM Global-approved, iron, nonrising-stem gate valves with indicator-post flange.
- C. Standard-pressure, **aboveground** fire-suppression water-service shutoff valves NPS 4 (DN 80) and larger shall be the following:
 - 1. 200-psig (1380-kPa), AWWA, iron, OS&Y, metal seated gate valves. (DCDA)
 - 2. AWWA butterfly valves. (Riser)
- D. Fire-suppression water-service check valves NPS 4 (DN 80) and larger shall be the following:
 - 1. AWWA check valves.
 - 2. UL-listed or FM Global-approved detector check valves.

END OF SECTION 211100

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SECTION 211119 – FIRE DEPARTMENT CONNECTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Exposed-type fire-department connections.
 - 2. Flush-type fire-department connections.
 - 3. Yard-type fire-department connections.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each fire-department connection.

PART 2 - PRODUCTS

2.1 EXPOSED-TYPE FIRE-DEPARTMENT CONNECTION

- A. Manufactures
 - 1. American Fire Hose & Cabinet
 - 2. Elkhart Brass Mfg. Co.
 - 3. Fire Protection Products, Inc.
 - 4. Fire-End & Croker Corporation
 - 5. GMR International Equipment Corporation
 - 6. Guardian Fire Equipment, Inc.
 - 7. Venus Fire Protection Ltd.
 - 8. Wilson & Cousins Inc.
- B. Standard: UL 405.
- C. Type: Exposed, projecting, for wall mounting.
- D. Pressure Rating: 175 psig (1200 kPa) minimum.
- E. Body Material: Corrosion-resistant metal.

- F. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
- G. Caps: Brass, lugged type, with gasket and chain.
- H. Escutcheon Plate: Round, brass, wall type.
- I. Outlet: Back, with pipe threads.
- J. Number of Inlets: Two
- K. Escutcheon Plate Marking: Similar to "AUTO SPKR"
- L. Finish: Polished chrome plated.
- M. Outlet Size: NPS 6 (DN 150)

2.2 FLUSH-TYPE FIRE-DEPARTMENT CONNECTION

- A. Manufactures
 1. American Fire Hose & Cabinet
 2. Elkhart Brass Mfg. Co.
 3. GMR International Equipment Corporation
 4. Guardian Fire Equipment, Inc.
 5. Potter Roemer LLC
 6. Venus Fire Protection Ltd.
- B. Standard: UL 405.
- C. Type: Flush, for wall mounting.
- D. Pressure Rating: 175 psig (1200 kPa) minimum.
- E. Body Material: Corrosion-resistant metal.
- F. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
- G. Caps: Brass, lugged type, with gasket and chain.
- H. Escutcheon Plate: Rectangular, brass, wall type.
- I. Outlet: With pipe threads.
- J. Body Style: Horizontal
- K. Number of Inlets: Two
- L. Outlet Location: Back

- M. Escutcheon Plate Marking: Similar to "AUTO SPKR & STANDPIPE"
- N. Finish: Polished chrome plated
- O. Outlet Size: NPS 6 (DN 150).

2.3 YARD-TYPE FIRE-DEPARTMENT CONNECTION

- A. Manufactures
 - 1. Elkhart Brass Mfg. Co.
 - 2. Fire Protection Products, Inc.
 - 3. Fire-End & Croker Corporation
 - 4. GMR International Equipment Corporation
 - 5. Guardian Fire Equipment, Inc.
 - 6. Potter Roemer LLC
 - 7. Wilson & Cousins Inc.
- B. Standard: UL 405.
- C. Type: Exposed, freestanding.
- D. Pressure Rating: 300 psig (2070 kPa)
- E. Body Material: Corrosion-resistant metal.
- F. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
- G. Caps: Brass, lugged type, with gasket and chain.
- H. Escutcheon Plate: Round, brass, floor type.
- I. Outlet: Bottom, with pipe threads.
- J. Number of Inlets: Two
- K. Sleeve: Brass
- L. Sleeve Height: 18 inches (460 mm).
- M. Escutcheon Plate Marking: Similar to "AUTO SPKR"
- N. Finish, Including Sleeve: Polished chrome plated.
- O. Outlet Size: NPS 6 (DN 150).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of fire-department connections.
- B. Examine roughing-in for fire-suppression standpipe system to verify actual locations of piping connections before fire-department connection installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install wall-type fire-department connections.
- B. Install yard-type fire-department connections in concrete slab support. Comply with requirements for concrete in Section 033000 "Cast-in-Place Concrete."
- C. Install two protective pipe bollards on sides of each fire-department connection. Comply with requirements for bollards in Section 055000 "Metal Fabrications."
- D. Install automatic (ball-drip) drain valve at each check valve for fire-department connection.

END OF SECTION 211119

SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipes, fittings, and specialties.
2. Cover system for sprinkler piping.
3. Specialty valves.
4. Sprinklers.
5. Alarm devices.
6. Manual control stations.
7. Control panels.
8. Pressure gages.

B. Related Requirements:

1. Section 211119 "Fire Department Connections" for exposed-, flush-, and yard-type fire department connections.
2. Section 230523 "General-Duty Valves for Water-Based Fire-Suppression Piping" for ball, butterfly, check, gate, post-indicator, and trim and drain valves.

1.3 DEFINITIONS

- A. High-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure higher than standard 175 psig, but not higher than 300 psig.
- B. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175-psig maximum.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For wet-pipe sprinkler systems.

1. Include plans, elevations, sections, and attachment details.
 2. Include diagrams for power, signal, and control wiring.
- C. Delegated-Design Submittal: For wet-pipe sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Domestic water piping.
 2. Compressed air piping.
 3. HVAC hydronic piping.
 4. Items penetrating finished ceiling include the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
- B. Qualification Data: For qualified Installer and professional engineer.
- C. Design Data:
1. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.
- D. Welding certificates.
- E. Field Test Reports:
1. Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
 2. Fire-hydrant flow test report.
- F. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wet-pipe sprinkler systems and specialties to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

1.8 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
 - a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.

B. Welding Qualifications: Qualify procedures and operators according to 2010 ASME Boiler and Pressure Vessel Code.

1.9 FIELD CONDITIONS

- ### A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:
1. Notify Construction Manager no fewer than three days in advance of proposed interruption of sprinkler service.
 2. Do not proceed with interruption of sprinkler service without Construction Manager's written permission.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- ### A. Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
1. NFPA 13 2016 Edition with State of California Amendments.
 2. 2019 California Fire Code
- ### B. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- ### C. High-Pressure Piping System Component: Listed for 300-psig working pressure.
- ### D. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design wet-pipe sprinkler systems.
1. Provide fire-hydrant flow test record showing the following conditions:

- a. Date.
 - b. Time.
 - c. Performed by.
 - d. Location of Residual Fire Hydrant R.
 - e. Location of Flow Fire Hydrant F.
 - f. Static Pressure at Residual Fire Hydrant R.
 - g. Measured Flow at Flow Fire Hydrant F.
 - h. Residual Pressure at Residual Fire Hydrant R.
2. Sprinkler system design shall be approved by authorities having jurisdiction.
- a. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
 - b. Sprinkler Occupancy Hazard Classifications:
 - 1) Building Service Areas: Ordinary Hazard, Group 1.
 - 2) Electrical Equipment Rooms: Ordinary Hazard, Group 1.
 - 3) General Storage Areas: Ordinary Hazard, Group 1.
 - 4) Libraries except Stack Areas: Light Hazard.
 - 5) Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
 - 6) Office and Public Areas: Light Hazard
 - 7) Classroom Areas: Light Hazard.
 - 8) Chemistry Lab: Ordinary Hazard, Group 2
3. Minimum Density for Automatic-Sprinkler Piping Design:
- a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
 - b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.
 - c. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. area.
 - d. Extra-Hazard, Group 1 Occupancy: 0.30 gpm over 2500-sq. ft. area.
 - e. Extra-Hazard, Group 2 Occupancy: 0.40 gpm over 2500-sq. ft. area.
 - f. Special Occupancy Hazard: As determined by authorities having jurisdiction.
4. Maximum Protection Area per Sprinkler: According to UL listing.
5. Maximum Protection Area per Sprinkler:
- a. Office Spaces: 225 sq. ft..
 - b. Storage Areas: 130 sq. ft..
 - c. Mechanical Equipment Rooms: 130 sq. ft..
 - d. Electrical Equipment Rooms: 130 sq. ft..
 - e. Other Areas: According to NFPA 13 recommendations unless otherwise indicated.
- E. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

2.2 STEEL PIPE AND FITTINGS

- A. Standard-Weight, Galvanized- and Black-Steel Pipe: ASTM A 53/A 53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.

- B. Schedule 30, Galvanized- and Black-Steel Pipe: ASTM A 135/A 135M; ASTM A 795/A 795M, Type E; or ASME B36.10M wrought steel, with wall thickness not less than Schedule 30 and not more than Schedule 40. Pipe ends may be factory or field formed to match joining method.
- C. Schedule 10, Black-Steel Pipe: ASTM A 135/A 135M or ASTM A 795/A 795M, Schedule 10 in NPS 5 and smaller; and NFPA 13-specified wall thickness in NPS 6 to NPS 10, plain end.
- D. Galvanized- and Black-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.
- E. Galvanized- and Uncoated-Steel Couplings: ASTM A 865/A 865M, threaded.
- F. Galvanized and Uncoated, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- G. Malleable- or Ductile-Iron Unions: UL 860.
- H. Cast-Iron Flanges: ASME 16.1, Class 125.
- I. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.
 - 1. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick ASME B16.21, nonmetallic and asbestos free or EPDM rubber gasket.
 - a. Class 125 and Class 250, Cast-Iron, Flat-Face Flanges: Full-face gaskets.
 - b. Class 150 and Class 300, Ductile-Iron or -Steel, Raised-Face Flanges: Ring-type gaskets.
 - 2. Metal, Pipe-Flange Bolts and Nuts: Carbon steel unless otherwise indicated.
- J. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.
 - 1. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- K. Grooved-Joint, Steel-Pipe Appurtenances:
 - 1. Manufacturers:
 - a. Victualic Company
 - b. Anvil International
 - c. Corcoran Piping Systems Co.
 - d. National Fittings, Inc
 - e. Shurjoint Piping Products USA Inc
 - f. Smith-Copper International
 - g. Tyco Fire Products LP
 - 2. Pressure Rating: 175-psig minimum.
 - 3. Galvanized or Uncoated Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting, with dimensions matching steel pipe.

4. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213 rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.
- L. Steel Pressure-Seal Fittings: UL 213, FM Global-approved, 175-psig pressure rating with steel housing, rubber O-rings, and pipe stop; for use with fitting manufacturers' pressure-seal tools.
 1. Manufacturers:
 - a. Victualic Company

2.3 COVER SYSTEM FOR SPRINKLER PIPING

1. Manufacturers:
 - a. DecoShield Systems, Inc.
- B. Description: System of support brackets and covers made to protect sprinkler piping.
- C. Brackets: Glass-reinforced nylon.
- D. Covers: Extruded-PVC sections of length, shape, and size required for size and routing of CPVC piping.

2.4 SPECIALTY VALVES

- A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
- B. Pressure Rating:
 1. Standard-Pressure Piping Specialty Valves: 175-psig minimum.
 2. High-Pressure Piping Specialty Valves: 300-psig.
- C. Body Material: Cast or ductile iron.
- D. Size: Same as connected piping.
- E. End Connections: Flanged or grooved.
- F. Alarm Valves:
 1. Manufacturers:
 - a. Victualic Company
 - b. Viking Corporation
 - c. Reliable Automatic Sprinkler Co., Inc
 2. Standard: UL 193.
 3. Design: For horizontal or vertical installation.
 4. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, retarding chamber, and fill-line attachment with strainer.
 5. Drip Cup Assembly: Pipe drain without valves and separate from main drain piping.
 6. Drip Cup Assembly: Pipe drain with check valve to main drain piping.

7. Electrical Components, Devices, and Accessories: Listed and labeled as defined in the California Electric Code, by a qualified testing agency, and marked for intended location and application.

G. Deluge Valves:

1. Manufacturers:
 - a. Victualic Company
 - b. Viking Corporation
 - c. Reliable Automatic Sprinkler Co., Inc
2. Standard: UL 260.
3. Design: Hydraulically operated, differential-pressure type.
4. Include trim sets for alarm-test bypass, drain, electrical water-flow alarm switch, pressure gages, drip cup assembly piped without valves and separate from main drain line, and fill-line attachment with strainer.
5. Wet, Pilot-Line Trim Set: Include gage to read diaphragm-chamber pressure and manual control station for manual operation of deluge valve, and connection for actuation device.

H. Automatic (Ball Drip) Drain Valves:

1. Manufacturers:
 - a. Reliable Automatic Sprinkler Co., Inc
 - b. Tyco Fire Products LP
2. Standard: UL 1726.
3. Pressure Rating: 175-psig minimum.
4. Type: Automatic draining, ball check.
5. Size: NPS 3/4.
6. End Connections: Threaded.

2.5 SPRINKLER PIPING SPECIALTIES

A. Branch Outlet Fittings:

1. Standard: UL 213.
2. Pressure Rating: 175-psig minimum.
3. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
4. Type: Mechanical-tee and -cross fittings.
5. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
6. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
7. Branch Outlets: Grooved, plain-end pipe, or threaded.

B. Flow Detection and Test Assemblies:

1. Manufacturers:
 - a. Victualic Company
 - b. Reliable Automatic Sprinkler Co., Inc
 - c. Tyco Fire Products LP
2. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
3. Pressure Rating: 175-psig minimum.

4. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded or grooved.

C. Branch Line Testers:

1. Manufacturers:
 - a. Potter Electric Signal Company, LLC
 - b. Potter Roemer LLC
 - c. Elkhart Brass Mfg. Co., Inc
2. Standard: UL 199.
3. Pressure Rating: 175 psig.
4. Body Material: Brass.
5. Size: Same as connected piping.
6. Inlet: Threaded.
7. Drain Outlet: Threaded and capped.
8. Branch Outlet: Threaded, for sprinkler.

D. Sprinkler Inspector's Test Fittings:

1. Manufacturers:
 - a. Victualic Company
 - b. Viking Corporation
 - c. Tyco Fire Products LP
2. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
3. Pressure Rating: 175-psig minimum.
4. Body Material: Cast- or ductile-iron housing with sight glass.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

E. Adjustable Drop Nipples:

1. Manufacturers:
 - a. Aegis Technologies, Inc.
 - b. CECA, LLC
 - c. Corcoran Piping System Co.
 - d. Merit Manufacturing
2. Standard: UL 1474.
3. Pressure Rating: 300 psig.
4. Body Material: Steel pipe with EPDM-rubber O-ring seals.
5. Size: Same as connected piping.
6. Length: Adjustable.
7. Inlet and Outlet: Threaded.

F. Flexible Sprinkler Hose Fittings:

1. Manufacturers:
 - a. Victualic Company
 - b. FlexHead Industries, Inc.
 - c. Fivalco Inc.

- d. Gateway Tubing, Inc.
2. Standard: UL 1474.
3. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
4. Pressure Rating: 300 psig.
5. Size: Same as connected piping, for sprinkler.

2.6 SPRINKLERS

1. Manufacturers:
 - a. Victualic Company
 - b. Viking Corporation
 - c. Reliable Automatic Sprinkler Co., Inc
- B. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
- C. Pressure Rating for Residential Sprinklers: 175-psig maximum.
- D. Pressure Rating for Automatic Sprinklers: 175-psig minimum.
- E. Pressure Rating for High-Pressure Automatic Sprinklers: 300 psig.
- F. Automatic Sprinklers with Heat-Responsive Element:
 1. Early-Suppression, Fast-Response Applications: UL 1767.
 2. Nonresidential Applications: UL 199.
 3. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.
- G. Sprinkler Finishes: Chrome plated, bronze, brass, or factory painted.
- H. Special Coatings: Wax and corrosion-resistant paint.
- I. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
 1. Ceiling Mounting: Chrome-plated steel, one piece, flat or Plastic, white finish, one piece, flat.
 2. Sidewall Mounting: Chrome-plated steel or Plastic, white finish, one piece, flat.
- J. Sprinkler Guards:
 1. Manufacturers:
 - a. Victualic Company
 - b. Viking Corporation
 - c. Reliable Automatic Sprinkler Co., Inc
 2. Standard: UL 199.
 3. Type: Wire cage with fastening device for attaching to sprinkler.

2.7 ALARM DEVICES

- A. Alarm-device types shall match piping and equipment connections.
- B. Water-Motor-Operated Alarm:
 - 1. Manufacturers:
 - a. Victualic Company
 - b. Viking Corporation
 - c. Tyco Fire Products LP
 - 2. Standard: UL 753.
 - 3. Type: Mechanically operated, with Pelton wheel.
 - 4. Alarm Gong: Cast aluminum with red-enamel factory finish.
 - 5. Size: 8-1/2-inches diameter.
 - 6. Components: Shaft length, bearings, and sleeve to suit wall construction.
 - 7. Inlet: NPS 3/4.
 - 8. Outlet: NPS 1 drain connection.
- C. Electrically Operated Alarm Bell:
 - 1. Manufacturers:
 - a. Potter Electric Signal Company LLC
 - b. Notifier
 - c. Fire-Lite Alarms, Inc
 - 2. Standard: UL 464.
 - 3. Type: Vibrating, metal alarm bell.
 - 4. Size: 10-inch diameter.
 - 5. Finish: Red-enamel factory finish, suitable for outdoor use.
 - 6. Electrical Components, Devices, and Accessories: Listed and labeled as defined in the California Electric Code, by a qualified testing agency, and marked for intended location and application.
- D. Water-Flow Indicators:
 - 1. Manufacturers:
 - a. Viking Corporation
 - b. System Sensor
 - c. Potter Electric Signal Company, LLC
 - 2. Standard: UL 346.
 - 3. Water-Flow Detector: Electrically supervised.
 - 4. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
 - 5. Type: Paddle operated.
 - 6. Pressure Rating: 250 psig.
 - 7. Design Installation: Horizontal or vertical.
- E. Pressure Switches:
 - 1. Manufacturers:

- a. Viking Corporation
- b. System Sensor
- c. Potter Electric Signal Company, LLC
2. Standard: UL 346.
3. Type: Electrically supervised water-flow switch with retard feature.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design Operation: Rising pressure signals water flow.

F. Valve Supervisory Switches:

1. Manufacturers:
 - a. System Sensor
 - b. Potter Electric Signal Company, LLC
 - c. Kennedy Valve Company
 - d. Fire-Lite Alarms, Inc
2. Standard: UL 346.
3. Type: Electrically supervised.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design: Signals that controlled valve is in other than fully open position.
6. Electrical Components, Devices, and Accessories: Listed and labeled as defined in the California Electric Code, by a qualified testing agency, and marked for intended location and application.

2.8 MANUAL CONTROL STATIONS

- A. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide" for hydraulic operation, with union, NPS 1/2 pipe nipple, and bronze ball valve.
- B. Include metal enclosure labeled "MANUAL CONTROL STATION," with operating instructions and cover held closed by breakable strut to prevent accidental opening.

2.9 PRESSURE GAGES

- A. Manufacturers:
 - a. AGF Manufacturing, Inc.
 - b. AMETEK, Inc.
 - c. Ashcroft Inc
 - d. Brecco Corporation
 - e. WIKA Instrument Corporation
- B. Standard: UL 393.
- C. Dial Size: 3-1/2- to 4-1/2-inch diameter.
- D. Pressure Gage Range: 0 to 300 psig.
- E. Label: Include "WATER" label on dial face.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.
- B. Report test results promptly and in writing.

3.2 SERVICE-ENTRANCE PIPING

- A. Connect sprinkler piping to water-service piping for service entrance to building. Comply with requirements for exterior piping in Section 211100 "Facility Fire-Suppression Water-Service Piping" for exterior piping.
- B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water-service piping. Comply with requirements for backflow preventers in Section 211100 "Facility Fire-Suppression Water-Service Piping."
- C. Install shutoff valve, check valve, pressure gage, and drain at connection to water service.

3.3 WATER-SUPPLY CONNECTIONS

- A. Connect sprinkler piping to building's interior water-distribution piping. Comply with requirements for interior piping in Section 221116 "Domestic Water Piping."
- B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water-distribution piping. Comply with requirements for backflow preventers in Section 221119 "Domestic Water Piping Specialties."
- C. Install shutoff valve, check valve, pressure gage, and drain at connection to water supply.

3.4 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.
 - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
 - 2. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.
- B. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.
- C. Install seismic restraints on piping. Comply with NFPA 13 and California Building Code requirements for seismic-restraint device materials and installation.

- D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- E. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
- H. Install sprinkler piping with drains for complete system drainage.
- I. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- J. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.
- K. Install alarm devices in piping systems.
- L. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13. In seismic-rated areas, refer to Section 210548 "Vibration and Seismic Controls for Fire-Suppression Piping and Equipment."
- M. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft-metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they are not subject to freezing.
- N. Pressurize and check preaction sprinkler system piping and air-pressure maintenance devices and air compressors.
- O. Fill sprinkler system piping with water.
- P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- Q. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- R. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 210518 "Escutcheons for Fire-Suppression Piping."

3.5 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.
- I. Steel-Piping, Pressure-Sealed Joints: Join lightwall steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.
- J. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.
 - 1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.
- K. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.
- L. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
- M. Steel-Piping, Pressure-Sealed Joints: Join Schedule 5 steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.

- N. Extruded-Tee Connections: Form tee in copper tube according to ASTM F 2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.
- O. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.6 INSTALLATION OF COVER SYSTEM FOR SPRINKLER PIPING

- A. Install cover system, brackets, and cover components for sprinkler piping according to manufacturer's "Installation Manual" and NFPA 13 for supports.

3.7 VALVE AND SPECIALTIES INSTALLATION

- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
- B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
- C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
- D. Specialty Valves:
 - 1. Install valves in vertical position for proper direction of flow, in main supply to system.
 - 2. Install alarm valves with bypass check valve and retarding chamber drain-line connection.
 - 3. Install deluge valves in vertical position, in proper direction of flow, and in main supply to deluge system. Install trim sets for drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.

3.8 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels.
- B. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.
- C. Install sprinklers into flexible, sprinkler hose fittings, and install hose into bracket on ceiling grid.

3.9 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

- B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.10 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 - 4. Energize circuits to electrical equipment and devices.
 - 5. Coordinate with fire-alarm tests. Operate as required.
 - 6. Coordinate with fire-pump tests. Operate as required.
 - 7. Verify that equipment hose threads are same as local fire department equipment.
- B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.11 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

3.12 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain specialty valves and pressure-maintenance pumps.

3.13 PIPING SCHEDULE

- A. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends, cast-iron threaded fittings, and threaded or grooved ends, grooved-end fittings, grooved-end-pipe couplings, and grooved joints.
- B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
- C. Standard-pressure, wet-pipe sprinkler system, NPS 2 and smaller, shall be one of the following:
 - 1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.

2. Standard-weight, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 3. Standard-weight, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 4. Standard-weight, galvanized-steel pipe with roll-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 5. Standard-weight, black-steel pipe with plain ends; steel welding fittings; and welded joints.
 6. Schedule 10 black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 7. Schedule 10 black-steel pipe with plain ends; welding fittings; and welded joints.
- D. Standard-pressure, wet-pipe sprinkler system, NPS 2-1/2 and larger, shall be one of the following:
1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
 2. Standard-weight, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 3. Standard-weight, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 4. Standard-weight, galvanized-steel pipe with roll-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 5. Standard-weight, black-steel pipe with plain ends; steel welding fittings; and welded joints.
 6. Schedule 10 black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 7. Schedule 10 black-steel pipe with plain ends; welding fittings; and welded joints.
- E. High-pressure, wet-pipe sprinkler system, NPS 4 and smaller, shall be one of the following:
1. Standard-weight, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 2. Standard-weight, galvanized-steel pipe with roll-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 3. Standard-weight, black-steel pipe with plain ends; steel welding fittings; and welded joints.
- F. High-pressure, wet-pipe sprinkler system, NPS 5 and larger, shall be one of the following:
1. Standard-weight, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 2. Standard-weight, galvanized-steel pipe with roll-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 3. Standard-weight, black-steel pipe with plain ends; steel welding fittings; and welded joints.

3.14 SPRINKLER SCHEDULE

- A. Use sprinkler types in subparagraphs below for the following applications:

1. Rooms without Ceilings: Upright sprinklers .
 2. Rooms with Suspended Ceilings: Pendent, recessed, flush, and concealed sprinklers as indicated.
- B. Provide sprinkler types in subparagraphs below with finishes indicated.
1. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
 2. Recessed Sprinklers: Finish as indicated on plans, with corresponding escutcheon.
 3. Upright, Pendent, and Sidewall Sprinklers: Finish as indicated on plans in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION 211313

SECTION 22 00 00 – GENERAL PLUMBING PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section covers and applies to all work included in Divisions 22.
- B. Work in this Section includes providing labor, materials, equipment, services necessary, fabrication, installation and testing for fully operational and safe systems including all necessary materials, appurtenances and features whether specified or shown in the contract documents or not, in conformity with all applicable codes and authorities having jurisdiction for the following:
 - 1. Plumbing work covered by all sections within Division 22 of the specifications, including, but not limited to:
 - a. Plumbing systems and equipment.

1.3 CODES AND REGULATIONS

- A. All work and materials shall be in accordance with current rules and regulations of applicable codes. Nothing in these Drawings or Specifications is to be construed to permit work not conforming to these codes. Should the Drawings or Specifications call for material or methods of construction of a higher quality or standard than required by these codes, the Drawings and Specifications shall govern. Applicable codes and regulations include, but are not necessarily limited to, the following:

California Building Code	CCR Title 24, Part 2
California Electrical Code	CCR Title 24, Part 3
California Mechanical Code	CCR Title 24, Part 4
California Plumbing Code	CCR Title 24, Part 5
California Energy Code	CCR Title 24, Part 6
California Fire Code	CCR Title 24, Part 9

1.4 DEFINITIONS

- A. Provide: The term "provide" as used in these specifications or on the drawings shall mean furnish and install.

- B. Piping: The term "piping" as used in these specifications or on the drawings shall mean all pipe, fittings, valves, hangers, insulation, etc. as may be required for a complete and functional system.
- C. Ductwork: The terms "duct" or "ductwork" as used in these specifications or on the drawings shall mean all ducts, fittings, joints, dampers, hangers, insulation, etc. as may be required for a complete and functional system.
- D. Wiring: The term "wiring" as used in these specifications or on the drawings shall mean all wiring, conduit, boxes, connections, transformers, relays, switches etc. as may be required for a complete and functional system.

1.5 PERMITS AND FEES

- A. The Contractor shall take out all permits and arrange for all tests in connection with his work as required. All charges are to be included in the work.

1.6 COORDINATION OF WORK

- A. Examination: Before starting work, thoroughly examine existing and newly completed underlying and adjoining work and conditions on which the installation of this work depends. Report to the Engineer in writing all conditions which might adversely affect this work.
- B. Layout: Layout of materials, equipment and systems is generally diagrammatic unless specifically dimensioned. Some work may be shown offset for clarity. The actual locations of all materials, piping, ductwork, fixtures, equipment, supports, etc. shall be carefully planned prior to installation of any work in order to avoid all interference with each other, or with structural, electrical, architectural or other elements.
- C. Verification: If discrepancies are discovered between drawing and specification requirements, the more stringent requirement shall apply. All conflicts shall be called to the attention of the Engineer prior to the installation of any work or the ordering of any equipment. No work shall be prefabricated or installed prior to this coordination. No costs will be allowed to the Contractor for any prefabrication or installation performed prior to this coordination. Verify the proper voltage and phase of all equipment with the electrical plans.
- D. Location of Utilities Prior to Trenching or Earthwork: The Contractor shall notify the Owner a minimum of two business days prior to beginning trenching or earthwork. Prior to this notification, the Contractor shall have marked all proposed trenches with paint and shall have contacted a utility locating company and have had this company mark all found underground utilities with paint. The Contractor shall then coordinate and arrange for a site visit with the Owner to review the proposed trenching and/or earthwork areas. Trenching and/or earthwork shall not begin until the Owner agrees. Repair and/or compensation for repair of marked utilities is the responsibility of the Contractor. The Owner retains the right to either self-perform the repair or require the Contractor to

complete the repair, as directed by the Owner. If while performing the work, the Contractor discovers utilities that have not been marked, the Contractor shall immediately notify the Owner verbally and in writing.

1.7 GUARANTEE

- A. Guarantee shall be in accordance with the General Conditions. The Contractor shall repair any defects due to faulty materials or workmanship and pay for any resulting damage to other work which appears within the guarantee period. These Specifications may extend the period of the guarantee for certain items. Where such extensions are called for, or where items are normally provided with guarantee periods in excess of that called for in the General Conditions, the certificate of guarantee shall be furnished to the Owner through the Engineer.

1.8 QUIETNESS

- A. Piping, ductwork and equipment shall be arranged and supported so that vibration is a minimum and is not transmitted to the structure.

1.9 DAMAGES BY LEAKS

- A. The Contractor shall be responsible for damages caused by leaks in the temporary or permanent piping systems prior to completion of work and during the period of the guarantee, and for damages caused by disconnected pipes or fittings, and the overflow of equipment prior to completion of the work.

1.10 EXAMINATION OF SITE

- A. The Contractor shall examine the site, compare it with Plans and Specifications, and shall have satisfied himself as to the conditions under which the work is to be performed. No allowance shall subsequently be made in his behalf for any extra expense to which he may be put due to failure or neglect on his part to make such an examination.

1.11 COMPATIBILITY WITH EXISTING SYSTEMS

- A. Any work which is done as an addition, expansion or remodel of an existing system shall be compatible with that system.

1.12 MATERIALS AND EQUIPMENT

- A. Materials and equipment shall be new unless otherwise noted. Materials and equipment of a given type shall be by the same manufacturer. Materials and equipment shall be free of dents, scratches, marks, shipping tags and all defacing features at time of project

acceptance. Materials and equipment shall be covered or otherwise protected during construction as required to maintain the material and equipment in new factory condition until project acceptance.

1.13 SUBMITTALS

- A. Shop Drawings: Within 30 days of contract award, the Contractor shall submit six copies of shop drawings for all materials, equipment, etc. proposed for use on this project. Material or equipment shall not be ordered or installed until written review is processed by the Engineer.

All shop drawings must comply with the following:

1. Shop drawings are required for all material and equipment items and shall include manufacturer's name and catalog numbers, dimensions, capacities, performance curves, and all other characteristics and accessories as listed in the specifications or on the drawings. Descriptive literature shall be current factory brochures and submittal sheets. Capacities shall be certified by the factory. FAX submittals are not acceptable.
 2. All shop drawings shall be submitted at one time in a neat and orderly fashion in a suitable binder with title sheet including Project, Engineer and Contractor, table of contents, and indexed tabs dividing each group of materials or item of equipment. All items shall be identified by the specification paragraph number for which they are proposed. All equipment shall also be identified by the mark number as indicated on drawings.
 3. All capacities, characteristics, and accessories called for in the specifications or on the drawings shall be high-lighted, circled or underlined on the shop drawings. Calculations and other detailed data indicating how the item was selected shall be included for items that are not scheduled. Data must be complete enough to permit detailed comparison of every significant characteristic which is specified, scheduled or detailed.
- B. Substitutions: Manufacturers and model numbers listed in the specifications or on the drawings represent the standard of quality and features desired. Proposed substitutions shall comply with the Owner's General Requirements. Calculations and other detailed data indicating how the item was selected shall be included. The Contractor shall assume full responsibility that substituted items or procedures will meet the specifications and job requirements and shall be responsible for the cost of redesign and modifications to the work caused by these items. At the Engineer's request, furnish locations where equipment similar to the substituted equipment is installed and operating along with the user's phone numbers and contact person. Satisfactory operation and service history will be considered in the acceptance or rejection of the proposed substitution.
- C. Review: Submittals will be reviewed for general conformance with the design concept, but this review does not guarantee quantity shown, nor does it supersede the responsibility of the Contractor to provide all materials, equipment and installation in accordance with the

drawings and specifications. The Contractor shall agree that shop drawing submittals processed by the Engineer are not Change Orders; that the purpose of shop drawing submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design concept, that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use. The Contractor shall agree that if deviations, discrepancies or conflicts between shop drawings and design drawings and specifications are discovered either prior to or after shop drawing submittals are processed by the Engineer, the design drawings and specifications shall control and shall be followed. If a resubmittal is required, submit a complete copy of the Engineer's review letter requiring such with the resubmittal.

1.14 MANUFACTURER'S RECOMMENDATIONS

- A. All material, equipment, devices, etc., shall be installed in accordance with the recommendations of the manufacturer of the particular item. The Contractor shall be responsible for all installations contrary to the manufacturer's recommendations. The Contractor shall make all necessary changes and revisions to achieve such compliance. Manufacturer's installation instructions shall be delivered to and maintained at the job site through the construction of the project.

1.15 SCHEDULING OF WORK

- A. All work shall be scheduled subject to the review of the Engineer and the Owner. No work shall interfere with the operation of the existing facilities on or adjacent to the site. The Contractor shall have at all times, as conditions permit, a sufficient force of workmen and quantity of materials to install the work contracted for as rapidly as possible consistent with good work, and shall cause no delay to other Contractors engaged upon this project or to the Owner. HVAC equipment and functions, whether existing or new, shall be maintained in operating condition whenever the facility is occupied, unless otherwise approved by the Owner.

1.16 DEMOLITION

- A. Existing equipment, ducts, piping, etc. noted for removal shall be removed and delivered to the Owner at a location to be determined by the Owner. Those items determined by the Owner to be of no value shall become the property of the Contractor and shall be removed from the job site by the Contractor at the Contractor's expense. Existing piping, ducts, services, etc. requiring capping shall be capped below floors, behind walls, above ceilings or above roof unless otherwise noted. Where items are removed, patch the surfaces to match the existing surfaces.

1.17 HAZARDOUS MATERIAL REMOVAL

- A. All hazardous material removal will be by the Owner. Hazardous material is to be removed

before the work is started. If the Contractor discovers hazardous material which has not been removed, the Contractor shall immediately cease work in that area and promptly notify the Owner.

1.18 OPENINGS, CUTTING AND PATCHING

- A. The locations and dimensions for openings through walls, floors, ceilings, foundations, footings, etc. required to accomplish the work under this Specification Division shall be provided under this Division. Except as noted below, the actual openings and the required cutting and patching shall be provided by other Divisions. Coring through existing concrete or masonry walls, floors, ceilings, foundations, footings, etc., and saw cutting of concrete floors or asphaltic concrete required to accomplish the work under this Specification Division shall be provided under this Division. Patching of these surfaces shall be provided by other Divisions. Cutting or coring shall not impair the strength of the structure. Any damage resulting from this work shall be repaired at the Contractor's expense to the satisfaction of the Engineer.

1.19 EXCAVATION AND BACKFILL

- A. General: Barrel of pipe shall have uniform support on sand bed. Sand shall be free from clay or organic material, suitable for the purpose intended and shall be of such size that 90 percent to 100 percent will pass a No. 4 sieve and not more than 5 percent will pass a No. 200 sieve. Unless otherwise noted, minimum earth cover above top of pipe or tubing outside building walls shall be 24", not including base and paving in paved areas.
- B. Excavation: Width of trench at top of pipe shall be minimum of 16", plus the outside diameter of the pipe. Provide all shoring required by site conditions. Where over excavation occurs, provide compacted sand backfill to pipe bottom. Where groundwater is encountered, remove to keep excavation dry, using well points and pumps as required.
- C. Backfill:
1. 6" Below, Around, and to 12" Above Pipe: Material shall be sand. Place carefully around and on top of pipe, taking care not to disturb piping, consolidate with vibrator.
 2. One Foot Above Pipe to Grade: Material shall be sandy or silty loam, free of lumps, laid in 6" layers, uniformly mixed to proper moisture and compacted to required density. If backfill is determined to be suitable and required compaction is demonstrated by laboratory test, water compaction in 6" layers may be used, subject to review by Engineer.
- D. Compaction: Compact to density of 95% within building and under walkways, driveways, traffic areas, paved areas, etc. and to 90% elsewhere. Demonstrate proper compaction by testing at top, bottom and one-half of the trench depth. Perform these tests at three locations per 100' of trench.

1.20 CONTINUITY OF SERVICES

- A. Existing services and systems shall be maintained except for short intervals when connections are made. The Contractor shall be responsible for interruptions of services and shall repair damage done to any existing service caused by the work. If utilities not indicated on the drawings are uncovered during excavation, the Contractor shall notify the Engineer immediately.

1.21 PROTECTIVE COATING FOR UNDERGROUND PIPING

- A. All ferrous pipe below grade (except cast iron) shall have a factory applied protective coating of extruded high density polyethylene, 35 to 70 mils total thickness, X-Tru-Coat, Scotchkote. All fittings and areas of damaged coating shall be covered with two layer double wrap of 10 mil polyvinyl tape to total thickness of 40 mils. John-Mansville. Protective coating shall be extended 6" above surrounding grade.
- B. All cast iron pipe shall have field applied tubular polyethylene encasement (polywrap) conforming to ANSI/AWWA C105/A21.5. All joints and transitions to have 2 layers of polywrap with ends sealed with adhesive tape or plastic tie straps around the poly wrap at 2'-0" intervals. Vertical risers to be wrapped thru vapor barrier. Wet seal joint water tight.

1.22 ACCESS DOORS

- A. Provide access doors as required where equipment, piping, valves, ductwork, etc. are not otherwise accessible. Access doors shall match the wall or ceiling finish and fire rating as indicated on the Architectural drawings. 16-gage steel frame and 14-gage steel door with paintable finish, except in ceramic tile, where door shall be 16-gage stainless steel with satin finish. Continuous hinge. Deliver doors to the General Contractor for installation. Milcor. Unless otherwise noted, the minimum sizes shall be as follows:

1 valve up to 1-1/2"	12" x 12"
1 valve up to 3"	16" x 16"

1.23 CONCRETE ANCHORS

- A. Steel stud with expansion wedge requiring a drilled hole – powder driven anchors are not acceptable. Minimum spacing shall be 12 diameters center to center and 10 diameters center to edge of concrete. Maximum allowable stresses for tension and shear shall be 80% of the ICC Evaluation Service Report (ESR) values. Minimum concrete embedment shall be the nominal embedment listed in the ESR table. Hilti Kwik Bolt TZ2.

1.24 EQUIPMENT ANCHORING AND OTHER SUPPORTS

- A. Mechanical systems (equipment, ductwork, piping, conduit, etc.) shall be anchored in accordance with the CBC. All systems mounted on concrete shall be secured with a

concrete anchor at each mounting point. All air handlers shall be mounted on spring isolators. Secure base plate as indicated above. Attachment of equipment, ductwork, piping, conduit, etc. supported on curbs or platforms shall be made to the side of curbs and platforms, where possible. Where screws or lag bolts must be installed through the top of a sheet metal cap, the installation shall be as follows. Pre-drill pilot hole. Fill pilot hole with polyurethane sealant. Install screw or lag bolt with a flat washer and an EPDM washer adjacent to the sheet metal.

1.25 SUPPORTS AND SEISMIC RESTRAINTS

- A. Any structural element required to hang or support piping, ducts or equipment provided under this Division and not shown on other drawings shall be provided under this Division.
- B. Mechanical systems (equipment, ductwork, piping, etc.) shall be provided with supports and seismic restraints in accordance with the CBC. Submit anchorage calculations and details stamped and signed by a structural engineer registered in the State of California. Submit shop drawings showing location, type and detail of restraints. Submit manufacturer's data for restraints. Restraint system shall be Mason West, Inc. (OSHPD OPM 0043-13).

1.26 PAINTING

- A. Paint all black iron supports, hangers, anchors, etc. with two coats of rust resisting primer. Also paint all uninsulated black iron piping exposed to weather with two coats of rust resisting primer.

1.27 ROOF PENETRATIONS AND PATCHING

- A. Whenever any part of the mechanical systems penetrates the roof or exterior wall, the openings shall be flashed and counter-flashed water tight with minimum 22 gauge galvanized sheet metal. Flashing shall extend not less than eight inches from the duct, pipe, or supporting member in all directions unless detailed otherwise. All roof penetrations and patching shall be in accordance with the recommendations of the National Roofing Contractor's Association and the Owner's roofing standards.

1.28 SYSTEM IDENTIFICATION

- A. Above Grade Piping: Provide markers on piping which is either exposed or concealed in accessible spaces. For piping systems, other than drain and vent lines, indicate the fluid conveyed or its abbreviation, either by pre-printed markers or stenciled marking, and include arrows to show direction of flow. Pre-printed markers shall be the type that wrap completely around the pipe, requiring no other means of fastening such as tape, adhesive, etc. Comply with ANSI A13.1 for colors. Locate markers at ends of lines, near major branches and other interruptions including equipment in the line, where lines pass through floors, walls or ceilings or otherwise pass into inaccessible spaces, and at 50' maximum intervals along exposed portions of lines. Marking of short branches and repetitive branches

for equipment connections is not required.

- B. Below Grade Piping: Bury a continuous, pre-printed, bright-colored, metallic ribbon marker capable of being located with a metal detector with each underground pipe. Locate directly over buried pipe, 6" to 8" below finished grade.
- C. Equipment: All equipment shall be identified with a plastic laminated, engraved nameplate which bears the unit mark number as indicated on the drawings (e.g. AC-4). Provide 1/2" high lettering - white on black background. Nameplates shall be permanently secured to the exterior of the unit.
- D. Valves: Provide brass valve tags with brass hooks or chains on all valves of each piping system, excluding check valves, valves within equipment, faucets, stops and shut-off valves at fixtures and other repetitive terminal units. Prepare and submit a tagged-valve schedule, listing each valve by tag number, location and piping service. Deliver to Owner through the Engineer.

1.29 CLEANING

- A. Progressively and at completion of the job, the Contractor shall thoroughly clean all of his work, removing all debris, stain and marks resulting from his work. This includes but is not limited to building surfaces, piping, equipment and ductwork, inside and out. Surfaces shall be free of dirt, grease, labels, tags, tape, rust, and all foreign material.

1.30 OPERATION AND MAINTENANCE INSTRUCTIONS

- A. Printed: Three copies of Operation and Maintenance Instructions and Wiring Diagrams for all equipment and parts list for all faucets, trim, valves, etc. shall be submitted to the Engineer. All instructions shall be clearly identified by marking them with the same designation as the equipment item to which they apply (e.g. AC-3). All Wiring Diagrams shall agree with reviewed Shop Drawings and indicate the exact field installation. All instructions shall be submitted at the same time and shall be bound in a suitable binder with tabs dividing each type of equipment (e.g. Pumps, Fans, Motors, etc.). Each binder shall be labeled indicating "Operating and Maintenance Instructions, Project Title, Contractor, Date" and shall have a Table of Contents listing all items included.
- B. Verbal: The Contractor shall verbally instruct the Owner's maintenance staff in the operation and maintenance of all equipment and systems. The controls contractor shall present that portion of the instructions that apply to the control system. The Engineer's office shall be notified 48 hours prior to this meeting.
- C. Acknowledgment: The Contractor shall prepare a letter indicating that all operation and maintenance instructions (printed and verbal) have been given to the Owner, to the Owner's satisfaction. This letter shall be acknowledged (signed) by the Owner and submitted to the Engineer.

1.31 RECORD DRAWINGS

- A. The Contractor shall obtain one set of prints for the project, upon which a record of all construction changes shall be made. As the work progresses, the Contractor shall maintain a record of all deviations in the work from that indicated on the drawings. Final location of all underground work shall be recorded by depth from finished grade and by offset distance from permanent surface structures, i.e. building, curbs, walks. In addition, the water, gas, sewer, under floor duct, etc. within the building shall be recorded by offset distances from building walls. An electronic copy of the original drawings will be made available to the Contractor. The Contractor shall transfer the changes, notations, etc. from the marked-up prints to the electronic copy. The record drawings (marked-up prints, electronic drawings disc and a hard copy) shall be submitted to the Engineer for review.

1.32 ACCEPTANCE TESTING

- A. The Contractor shall perform, document and submit all acceptance testing as required by California Code of Regulations, Title 24, Part 6.

END OF SECTION

SECTION 22 00 50 – PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 GENERAL MECHANICAL PROVISIONS

- A. The preceding General Mechanical Provisions shall form a part of this Division with the same force and effect as though repeated here.

1.3 SCOPE

- A. Included: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:
 - 1. Sanitary sewer system.
 - 2. Domestic water system.
 - 3. Fuel gas system.
 - 4. Drain system (including condensate drain).
 - 5. All equipment as shown or noted on the drawings or as specified.
 - 6. Demolition as indicated on drawings. Where demolition is called for, remove all equipment, piping, braces, housekeeping pads, supports and related items no longer required.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Sanitary Sewer:
 - 1. Soil, Waste and Vent Piping: Inside Building and Within Five Feet of Building Walls: Standard weight coated cast iron pipe and fittings, CISPI 301, or hub end with rubber gaskets, ASTM A74, ASTM C564. All cast iron pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute as manufactured by Tyler, AB&I or Charlotte. Heavy-duty shielded couplings, Type 304 stainless steel, with neoprene gasket, ASTM C1540. Husky HD 2000, Clamp-All 80. Mission HeavyWeight MG Couplings are also acceptable. Size 2" and smaller above grade may be standard weight galvanized steel, ASTM

A120/A53, with coated cast iron recessed drainage fittings, ANSI B16.12. 2" and smaller exposed to view shall be galvanized steel, ASTM A120/A53, with coated cast iron recessed drainage fittings, ANSI B16.12.

All cast iron pipe shall have field applied tubular polyethylene encasement (polywrap) conforming to ANSI/AWWA C105/A21.5. All joints and transitions to have 2 layers of polywrap with ends sealed with adhesive tape or plastic tie straps around the poly wrap at 2'-0" intervals. Vertical risers to be wrapped thru vapor barrier. Wet seal joint watertight.

2. Cleanouts: Comparable models of Josam, Wade or Zurn are acceptable. Floor Cleanouts: Smith 4028 with nickel bronze top in finished areas; Smith 4228 in utility areas. Wall Cleanouts: Smith 4532 with stainless steel cover and screw. Pipe Cleanouts: Iron body with threaded brass plug.
3. Cleanout Box: Precast reinforced concrete. Cast iron lid marked for service. Christy F22 in foot traffic areas; G5 in roadways.

B. Water and Gas:

1. Cold Water Piping:

a. Inside Building, Within Five Feet of Building Walls, and All Above Grade:

- 1) Hard temper seamless copper, ASTM B88. Wrought copper fittings, ANSI B16.22. Type L with brazed joints (1100F, min.). 1-1/2" and smaller above grade may be soldered, 95-5 tin-antimony solder. All nipples shall be red brass (85% copper). Above grade fittings may be copper (1/2" to 2") or bronze (2-1/2" to 4") press fittings, ASME B16.18 or ASME B16.22. EPDM O-rings. Installation shall be in accordance with the manufacturer's installation instructions. Nibco, ProPress.

b. Outside Building - Below Grade:

- 1) Schedule 40 galvanized steel pipe, ASTM A120/A53. 150 psi galvanized malleable iron screwed fittings, ANSI B16.3. Galvanized steel shall have protective coating.

-or-

- 2) Same as Inside Building. Press fittings are not acceptable below grade.

-or-

- 3) 3" and Smaller: Schedule 40 Polyvinyl chloride (PVC) with solvent weld fittings where approved by administrative authority.

2. Hot Water Piping:

a. Inside Building - Above Slab: Same as Cold Water Piping - Inside

Building.

- b. Outside Building or Below slab: Pre-insulated. Type L copper core. 1" foamed polyurethane insulation. Polyvinyl chloride jacket. Sealed ends. Rubber ring internal slip joint. Fittings shall be wrought copper, with brazed joints (1100F, min.). Ricwil, Thermal Pipe Systems.

3. Gas Piping:

- a. Inside Building and All Above Grade: 2" and Smaller: Schedule 40 galvanized steel pipe, ASTM A120/A53. 150 psi galvanized malleable iron screwed fittings, ANSI B16.3, ANSI B31.8. Flexible connections shall be convoluted yellow brass with dielectric couplings, AGA approved. 2-1/2" and larger: Schedule 40 black steel pipe, ASTM A120/A53. Standard weight carbon steel welding fittings, long radius ells, ANSI B16.9.
- b. Inside Building - Below Grade to Five Feet Outside Building: Same as Inside Building and All Above Grade. Provide sleeves and vents acceptable to administrative authority.
- c. Outside Building - Below Grade: Polyethylene pipe and fittings, ASTM D2513. PolyPipe GDY 20, PE 2406/2708. Otherwise, piping shall be coated schedule 40 steel.

4. Valves and Specialties:

a. Valves:

- 1) General: Manufacturer's model numbers are listed to complete description. Equivalent models of Crane, Grinnell, Milwaukee, Nibco, Stockham or Walworth are acceptable. All valves of a particular type or for a particular service shall be by the same manufacturer. Butterfly valves may be substituted for 2-1/2" and larger gate valves above grade; see specification below. Use full port ball valve for 2" and smaller water shutoff valves; see specification below.
- 2) Gate Valve: 2" and Smaller: All bronze. Rising stem. Union bonnet. Wedge disk. Malleable iron handwheel. 200 psi WOG. Stockham B-105. 2-1/2" and Larger: Iron body, bronze mounted. Non-rising stem. Wedge disk. 200 psi WOG. Flanged or AWWA hub end as applicable. Stockham G-612. Underground valves shall have square operating nut. Provide one operating "T" handle for underground valves.
- 3) Butterfly Valve: Iron threaded lug body. Aluminum bronze disk. O-ring seals. Resilient, removable seat. 416 stainless steel shaft. 6" and smaller valves shall have multi-position lever handle. 8" and

larger valves shall have gear operator. Provide 2" extension neck at insulated pipes. Demco Series NE, Grinnell, Stockham

- 4) Check Valve: 2" and Smaller: All bronze swing check, regrinding. 200 psi WOG. Stockham B-319.
- 5) Ball Valve: Full port. Bronze body, cap, stem, disk and ball. Screwed connection. Lever handle. TFE seat. O-ring seals. 300 psi WOG. Apollo, Grinnell, Jomar.
- 6) Plug Valve: Valves in gas piping systems must be UL listed for gas distribution. 4" and Smaller: Eccentric bronze or nickel plated semi-steel plug. Semi-steel body. Bronze bushings. Buna-N-rings. 175 psi WOG. DeZurik Series 400. 1-1/2" and smaller natural gas valves may be full port ball valves. Apollo, Jomar, Grinnell.
- 7) Valve Box: Precast reinforced concrete. Cast iron lid marked for service. Christy G5 in roadways (use B-9 for ball valves).
- 8) Earthquake Valve: Valves must be UL listed for gas distribution and comply with ASCE 25. Cast-aluminum body with stainless-steel internal parts; horizontal orientation; nitrile-rubber, reset-stem o-ring seal; open-or-closet valve position indicator; composition valve seat with calpper held by spring or magnet locking mechanism; level indicator. 2" and Smaller: threaded connections. 2-1/2" and Larger: flanged connections. Pacific Seismic Products.

c. Miscellaneous Specialties:

- 1) Temperature and Pressure Relief Valve: ASME rated fully automatic, reseating combination temperature and pressure relief valve sized in accordance with energy input. Sensing element immersed within upper 6" of tank. Watts.
- 2) Union: 2" and Smaller: AAR malleable iron, bronze to iron ground seat. 300 psi. Grinnell. Size 2-1/2" and Larger: Grooved pipe, synthetic gasket, malleable iron housing. Victaulic Style 77, Type "E" gasket, Grinnell.
- 3) Dielectric Coupling: Insulating union or flange rated for 250 psig. EPCO.
- 4) Shock Absorber: Multiple bellows. Seamless copper chamber approved for concealed installations. Designed and applied in accordance with PDI WH201. Sioux Chief, Watts.
- 5) Flexible Connection: Corrugated bronze core covered with high tensile bronze tubular braid. 150 psi working pressure. 2" and

smaller shall have screwed connections. 2-1/2" and larger shall have flanged connections. Flexonics, Keflex.

- C. Drain Piping (including Condensate): Copper Type L with brazed joints as specified above for inside building cold water piping. No press fittings for drain piping.
- D. Miscellaneous Piping Items:
 - 1. Pipe Support:
 - a. Pipe Hanger: Steel "J" hanger with side bolt for piping 4" and smaller; steel clevis hanger for piping 5" and larger. Load and jam nuts. Size and maximum load per manufacturer's recommendation. Felt liner for copper piping. Hanger and rod shall have galvanized finish. B-Line, Grinnell, Unistrut.
 - b. Isolating Shield: Galvanized steel shell and reinforcing ribs. 1/4" non-conducting hair felt pad. Pipe hanger in accordance with paragraph above. Increase hanger size per manufacturer's recommendation. B-Line, Semco, Superstrut.
 - c. Construction Channel: 12-gage, 1-5/8" x 1-5/8" galvanized steel channel. Single or multiple section. Self-locking nuts and fittings. B-Line, Grinnell, Unistrut.
 - 2. Flashing: Vent flashing shall be 4 lb/ft² lead, 16" sq. flange, length sufficient to be turned down 2" into vent. Oatey. Flashing for other piping through roof shall be prefabricated galvanized steel roof jacks with 16" sq. flange. Provide clamp-on storm collar and seal water tight with mastic. For cold process built-up roof, material shall be 4 lb/ft² lead instead of galvanized steel.

2.2 PIPING INSULATION MATERIALS

- A. General: All piping insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.
- B. Pre-Molded Fiberglass: Heavy density sectional pre-molded fiberglass with vapor barrier laminated all service jacket and pressure sealing vapor barrier lap. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft²-F at a mean temperature of 50F. Perm rating 0.02, ASTM E96. Puncture rating 50 Beach units, ASTM D781. Provide 3" (min.) wide tape of same material as lap for butt joints. For hot water piping, thickness shall be 1" for pipe sizes 3/4" and less; 1-1/2" thickness for pipe sizes 1" and larger. Certainteed, Knauf, Johns-Manville, Owens-Corning.
- C. Fiberglass Blanket: Unfaced. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft²-F at a mean temperature of 50F. 1-1/2" thickness. Knauf, Johns-Manville, Owens-Corning.

- D. PVC Jacket (for pipe, fittings and valves): Pre-molded polyvinyl chloride (PVC) jackets, 0.020" thickness. Size to match application. Provide solvent weld adhesive and PVC vapor barrier pressure sealing tape by same manufacturer. Zeston.
- E. Stretchable Glass Fabric: Reinforcing mesh. 10 X 20 continuous filament glass yarns per inch. Johns-Manville.
- F. Vapor Barrier Coating: Childers CP-30, Foster 30-25.
- G. Lagging Adhesive: Childers CP-50A, Foster 30-36.
- H. Outdoor Mastic: Childers CP-21, Foster 65-05.
- I. Insulating Tape: Ground virgin cork and synthetic elastomeric. Black, odorless, and non-toxic. K factor 0.43 Btu-in/hr-ft²-F or less. Non-shrinking. For outdoor use, provide protective finish by same manufacturer. Halstead.
- J. Molded Closed Cell Vinyl (Piping Insulation Under Disabled Accessible Lavatories and Sinks): Fully molded closed cell vinyl, 3/16" thick. Internal ribs on drain insulation to provide air gap. Thermal conductivity shall not exceed 1.17 BTU-in/hr-ft²-°F at an average temperature of 73°F. Weep hole in cleanout nut enclosure. Out of sight nylon fastening system. Hinged cap over valve to allow access for servicing. Truebro Lav-guard.

2.3 FIXTURES

- A. General: Provide rough-in for and install all plumbing fixtures shown on drawings. Except in equipment rooms, all trim, valves and piping not concealed in wall structure, above ceiling or below floors, shall be brass with polished chrome plate finish, unless noted otherwise. All enameled fixtures shall be acid resisting. Standard color is white unless otherwise noted.
- B. Schedule: Refer to Plumbing Fixture Schedule on the drawings for list of fixtures and trim. Manufacturer's model numbers are listed to complete description. Equivalent models of American Standard, Eljer, Elkay, Haws, Kohler or T&S Brass are acceptable. For drainage fixtures, equivalent models of Josam, Smith or Zurn are acceptable.
- C. Stops and P-Traps: All fixtures shall be provided with stops and P-Traps as applicable. Wall mounted faucets, valves, etc. shall have integral stops or wall mounted stops.
 - 1. Stops: All hot and cold water supplies shall be 1/2" I.P.S. inlet angle stops with stuffing box, loose key lock shield, and brass riser (3/8" for 2-1/2 gpm and less, otherwise 1/2"). McGuire, Speedway.
 - 2. P-Traps: Semi-cast brass, ground joint. 17-gage. Clean-out plug. Unobstructed waterway. California Tubular, McGuire.

2.4 EQUIPMENT

A. General Requirements:

1. Capacity: Capacities shall be in accordance with schedules shown on drawings. Capacities are to be considered minimum.
2. Dimensions: Equipment must conform to space requirements and limitations as indicated on drawings and as required for operation and maintenance. Equipment will not be accepted that does not readily conform to space conditions. Prepare and submit layout drawings for all proposed equipment (different than scheduled units) showing actual job conditions, required clearances for proper operation, maintenance, etc.
3. Ratings:
 - a. Electrical: Electrical equipment shall be in accordance with NEMA standards and UL or ETL listed where applicable standards have been established.
 - b. Gas: Gas burning equipment shall be furnished with 100% safety gas shut-off, intermittent pilot ignition, and be approved by AGA.
4. Piping: Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be provided. Equipment requiring domestic water for non-potable use shall be provided with backflow preventer acceptable for intended use by local governing authorities.
5. Electrical:
 - a. General: Each item or assembly of items shall be furnished completely wired to individual terminal blocks for connection to single branch electrical circuit. All electrical accessories and controls required by equipment shall be furnished. Provide terminal blocks for controls and interlocks not included in equipment package. Controllers and other devices shall be in NEMA 1 or 3R enclosures as applicable.
 - b. Wiring: Conductors, conduit, and wiring shall be in accordance with Electrical Specifications. Individual items within assembly shall be separately protected with dead front, fused disconnect, fuse block, or circuit breaker for each ungrounded conductor, all accessible on operating side of equipment. Switches, contacts and other devices shall be in ungrounded conductors.
 - c. Submittals: Included in shop drawings shall be internal wiring diagrams and manufacturer's recommended external wiring.

- B. Water Heater: Electric. Glass lined tank with magnesium anode protection. 150 psi working pressure. Fully insulated. Automatic temperature control. High limit control. Provide

ASME rated temperature and pressure relief valve sized in accordance with energy input, dielectric couplings and drain cock. UL listed. A.O. Smith, American Appliance, State Industries.

- C. Water Heater: Electric. Tankless point-of-use instant hot water heater. Cast aluminum housing, celcon waterways and nichrome coils. Maximum 150 psi rating. UL listed. Chromomite, Eemax.
- D. Circulating Pump: In-line centrifugal. Aluminum housing. All parts exposed to fluid, stainless steel. Water lubricated ceramic shaft and bearings. Epoxy encapsulated windings. Grundfos, Bell and Gossett, Taco.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. General:

1. Piping Layout: Piping shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location to be approved by the Engineer. No structural member shall be weakened by cutting, notching, boring or otherwise, unless specifically allowed by structural drawings and/or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. All piping shall be installed in a manner to ensure unrestricted flow, eliminate air pockets, prevent any unusual noise, and permit complete drainage of the system. All piping shall be installed to permit expansion and contraction without strain on piping or equipment. Vertical lines shall be installed to allow for building settlement without damage to piping. Pipe sizes indicated on the drawings are nominal sizes unless otherwise noted. Provide secondary drain piping where required.
2. Joints:
 - a. Threaded: Pipe shall be cut square and reamed to full size. Threads shall be in accordance with ANSI B2.1. Joint compound or tape suitable for conveyed fluid shall be applied to male thread only. Joints shall be made with three threads exposed.
 - b. Welded or Brazed: Filler rod shall be of suitable or the same alloy as pipe. Brazing filler metal shall have a minimum melting point of 1100F. Welding or brazing shall be performed by a Certified Welder or Brazer as certified by an organization/institution that uses standards recognized by the American Welding Society (AWS) and meets the requirements of the ASME Boiler and Pressure Vessels Code, Section 9.
 - c. Open Ends: Open ends of piping shall be capped during progress of work to preclude foreign matter.

- d. Electrical Equipment: Piping shall not be run over electrical panels, motor control centers or switchboards.

3. Fittings and Valves:

- a. Standard Fittings: All joints and changes in direction shall be made with standard fittings. Close nipples shall not be used.
- b. Reducers: Pipe size reduction shall be made with bell reducer fittings. Bushings shall not be used.
- c. Unions: A union shall be installed on the leaving side of each valve, at all sides of automatic valves, at equipment connections, and elsewhere as necessary for assembly or disassembly of piping.
- d. Valves: All valves shall be full line size. Provide shut-off valve for each building and each equipment connection. Provide shut-off valve at each point of connection to existing piping. At equipment connections, valves shall be full size of upstream piping, except that gas valves within 18" of the point of connection to the equipment may be the same size as the equipment connection.
- e. Valve Accessibility: All valves shall be located so that they are easily accessible. Valves located above ceilings shall be installed within 24" of the ceiling. Refer to specification 200000 for access requirements.

4. Pipe Support:

- a. General: Hangers shall be placed to support piping without strain on joints or fittings. Maximum spacing between supports shall be as specified below. Actual spacing requirements will depend on structural system. Side beam clamps shall be provided with retaining straps to secure the clamp to the opposite side of the beam. Vertical piping shall be supported with riser clamp at 20' on center (maximum). Support pipe within 12" of all changes in direction. Support individual pipes with pipe hanger. Copper piping systems which protrude through a surface for connection to a fixture stop or other outlet shall be secured with a drop ell, Grinnell No. 9788; nipple through surface shall be threaded brass.

1) Pressure Pipe:

<u>Pipe Size (Inches)</u>	Copper	<u>Maximum Spacing*</u> <u>Between Supports (ft.)</u>	
		Sch. 40 steel	Plastic steel
1/2	6	6	4
3/4	6	8	4
1	6	8	4
1-1/4	6	10	4
1-1/2	6	10	4
2	10	10	4

2-1/2	10	10	4
3	10	10	4
4	10	10	4

*Based on straight lengths of pipe with couplings only. Provide additional supports for equipment, valves or other fittings. Plastic piping shall be supported per the manufacturer's recommendations. Seismic requirements may reduce maximum spacing.

- 2) Gravity Drain Pipe: Piping shall be supported at each length of pipe or fitting, but in no case at greater spacing than indicated above for pressure pipe.
 - b. Hot and Cold Water Piping: All hot and cold water piping shall have isolating shield; no portion of this piping shall touch the structure without an isolating shield except at anchor points for fixture rough-in.
 - c. Trapeze: Trapeze hangers of construction channel and pipe clamps may be used. Submit design to Engineer for review.
5. Miscellaneous:
- a. Escutcheons: Provide chrome plated metal escutcheons where piping penetrates walls, ceilings, or floors in finished areas.
 - b. Pipe Sleeves: All piping passing through concrete shall be provided with pipe sleeves. Allow 1" annular clearance between sleeve and pipe for piping 3" and smaller, otherwise 2" annular clearance. Piping through walls below grade shall be sealed with Link-Seal.
 - c. Pipes Passing through Fire Rated Surfaces: Pipes passing through fire rated walls, floors, ceilings, partitions, etc. shall have the annular space surrounding the pipe or pipe insulation sealed with fire rated materials in accordance with the requirements of the fire authority having jurisdiction.
 - d. Dielectric Couplings: Dielectric couplings shall be installed wherever piping of dissimilar metals are joined, except that bronze valves may be installed in ferrous piping without dielectric couplings.
 - e. Thermometer or Pressure Gage Tap: Provide tee for instrument well. Minimum size of pipe surrounding well shall be 1-1/2".
 - f. Exposed Pipe at Fixtures: Piping extending from finished surfaces into a finished room shall be chrome plated brass, except under kitchen sinks in commercial kitchens.

B. Sanitary Sewer Piping:

- 1. General: Where inverts are not indicated, sanitary sewer piping shall be installed at

1/4" per foot pitch. Piping 4" and larger may be installed at 1/8" per foot pitch where structural or other limitations prevent installation at a greater pitch. Bell and spigot piping shall be installed with barrel on sand bed; excavate hole for bell.

2. Cleanouts: Install cleanouts at ends of lines, at changes of direction greater than 45 degrees, and at not greater than 100 foot intervals. Locate interior cleanouts in accessible locations and bring flush to finished surface.
 3. Vents: Vents shall terminate not less than 6" above the roof nor less than 24" from any vertical surface nor within 10' of any outside air intake. Install horizontal vent lines at 1/4" per foot pitch. Offset vents 2' minimum from gutters, parapets, ridges and roof flashing.
- C. Water Piping: Connections to branches and risers shall be made from top of main. Supply header in fixture battery shall be full size to last fixture, reducing in size only on individual connections to each fixture in battery. Minimum pipe size shall be 3/4", unless otherwise noted. Exposed fixture stops and flush valves shall be installed with brass nipples for copper piping and galvanized nipples for galvanized piping. Nipples are to extend from outside of wall to fitting at header or drop behind finish wall surfaces. Pipe nipples shall be same size as stop or flush valve. Provide shut off for each building and each connection to equipment. Shock absorbers shall be installed in a vertical position per manufacturer's instructions and per PDI-WH 201 where flush valves, metering faucets or other fast acting valves are connected to the domestic piping system. Only equipment mounted on vibration isolators shall be connected with flexible connections. Underground hot water and cold water piping which run parallel to each other shall be installed a minimum of 3 feet apart.
- D. Gas Piping: Installation shall comply with CPC and NFPA 54 (National Fuel Gas Code). Shall be pitched to drain to dirt legs at low points. No unions shall be installed except at connections to equipment. Provide shutoff and dirt leg at each equipment connection. Only equipment mounted on vibration isolators shall be connected with flexible connectors. Under floor piping shall be sleeved and vented. Underground Polyethylene pipe and butt fusion fittings shall be joined in accordance with manufacturer's recommendations. Metal to plastic transition fittings shall be installed at all transitions. Provide 14-gage insulated tracer wire secured to pipe at 10' intervals with nylon ties. Terminate tracer 6" above grade at both ends.
- E. Drain Piping (Including Condensate): Install with constant pitch to receptacle, 1/4" per foot where possible, otherwise 1/8" per foot minimum. Provide TEE with clean-out plug at all changes of direction. Provide trap at each air handling unit to prevent air leakage. Only equipment mounted on vibration isolators shall be connected with flexible connection. Piping not concealed in wall structure, above ceilings or below floors shall be chrome plated brass.
- F. PVC Piping: Shall be cut square and assembled prior to solvent weld. Apply primer per manufacturer's recommendations. Coat male joint fully with solvent, make joint before solvent dries and wipe exterior clean.

3.2 PIPING INSULATION INSTALLATION:

A. Domestic Hot Water:

1. General: All domestic hot water piping, fittings and accessories shall be insulated.
2. Pipe: Apply pre-molded fiberglass sections to pipe using integral pressure sealing lap adhesive in accordance with manufacturer's recommendations. Stagger longitudinal joints. Seal butt joints with factory supplied pressure sealing tape.
3. Fittings and Valves:
 - a. Wrap all fittings and valves with pre-cut fiberglass blanket to thickness matching adjoining insulation. Cover blanket with PVC jacket in accordance with manufacturer's recommendations. Solvent weld. Seal all joints with factory supplied pressure sealing vapor barrier tape with 1-1/2" (min.) overlap on both sides of joint. Insulate valves to stem. Do not insulate unions, flanges or valves unless water temperature exceeds 140°F or the piping is exposed to weather.
 - b. For miscellaneous fittings and accessories for which PVC jackets are not available or where proximity of fittings precludes a neat-appearing installation, the Contractor may cover the fiberglass blanket with stretchable glass fabric, one coat of lagging adhesive and a final coat of vapor barrier coating. All exposed ends of insulation shall be adequately sealed.
4. Additional Finish for Exposed Piping and Equipment: All piping and equipment exposed to view but protected from the weather shall be given an additional finish of PVC jackets.

B. Cold Water Piping-Freeze Protection: All cold water piping exposed to weather shall be wrapped with insulating tape, 50% overlap. Cover valves to stem. Apply at least two coats of protective finish.

C. Piping Insulation Under Disabled Accessible Lavatories and Sinks: Hot and cold water piping, hot and cold water stop and drain piping under disabled accessible lavatories and sinks shall be insulated with 3/16" thick molded closed cell vinyl to prevent accidental injury due to contact or temperature extremes. Installation shall be in accordance with manufacturer's instructions. There shall be no sharp or abrasive surfaces under disabled accessible lavatories and sinks.

3.3 FIXTURE INSTALLATION

A. Fixture Height: Shall be as indicated on Architectural drawings.

B. Floor Drains or Floor Sinks: Shall be placed parallel to room surfaces, set level, flush with floor, and adjusted to proper height to drain. Cover openings during construction to keep all

foreign matter out of drain line.

- C. Wall Hung Fixtures: Shall be provided with proper backing and hanger plates secured to wall. Lavatories shall be supported with concealed arm supports. Fixtures mounted on carriers shall bear against stop nuts, clear of wall surface. Caulk fixtures against walls with white G.E. "Sanitary 1700" silicone sealant. Caulking shall be smooth and flush with fixture surface (not concave).
- D. Floor Mounted Fixtures: Shall be provided with proper support plates. Grout at the floor with waterproof ceramic tile grout.
- E. Other Connections: Rough-in and connection for trim or fixtures supplied by others shall be included in this specification section.

3.4 EQUIPMENT INSTALLATION

- A. General: It shall be the responsibility of the equipment installer to insure that no work done under other specification sections shall in any way block, or otherwise hinder the equipment. All equipment shall be securely anchored in place.
- B. Connections to Equipment: Where size changes are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet.

3.5 TESTS AND ADJUSTMENTS

- A. General: Unless otherwise directed, tests shall be witnessed by a representative of the Engineer. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and entire work retested. Tests may be made in sections, however, all connections between sections previously tested and new section shall be included in the new test.
- B. Gravity Systems:
 - 1. Sanitary Sewer: All ends of the sanitary sewer system shall be capped and lines filled with water to the top of the highest vent, 10' above grade minimum. This test shall be made before any fixtures are installed. Test shall be maintained until all joints have been inspected, but no less than 2 hours.
 - 2. Drains (Including Condensate): Similar to Sanitary Sewer.
- C. Pressure Systems:
 - 1. General: There shall be no drop in pressure during test except that due to ambient temperature changes. All components of system not rated for test pressure shall be

isolated from system before test is made.

2. Domestic Hot and Cold Water Piping: Maintain 100 psig water pressure for 4 hours.
3. Gas Piping: Maintain 100 psig air pressure for 4 hours.

3.6 DISINFECTION

- A. Disinfect all domestic water piping systems in accordance with AWWA Standard C651, "AWWA Standard for Disinfecting Water Mains", and in accordance with administrative authority. Disinfection process shall be performed in cooperation with health department having jurisdiction and witnessed by a representative of the Engineer. During procedure signs shall be posted at each water outlet stating, "Chlorination - Do Not Drink". After disinfection, water samples shall be collected for bacteriological analysis. Certificate of Bacteriological Purity shall be obtained and delivered to the Owner through the Engineer.

END OF SECTION

SECTION 22 1113-FACILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes water-distribution piping and related components outside the building for water service.
- B. Utility-furnished products include water meters that will be furnished to the site, ready for installation.

1.2 DEFINITIONS

- A. LLDPE: Linear, low-density polyethylene plastic.
- B. PVC: Polyvinyl chloride plastic.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control test reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Comply with requirements of authorities supplying water. Include tapping of water mains and backflow prevention.
 - 2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.

- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- C. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.
- D. NSF Compliance:
 - 1. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, according to the following:
 - 1. Ensure that valves are dry and internally protected against rust and corrosion.
 - 2. Protect valves against damage to threaded ends and flange faces.
 - 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves, according to the following:
 - 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
 - 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.8 PROJECT CONDITIONS

- A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:
 - 1. Notify Owner no fewer than two days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of water-distribution service without Owner's written permission.

1.9 COORDINATION

- A. Coordinate connection to water main with utility company or authority having jurisdiction.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

- A. PVC, Schedule 40 Pipe: ASTM D 1785.
 - 1. PVC, Schedule 40 Socket Fittings: ASTM D 2466.
- B. PVC, Schedule 80 Pipe: ASTM D 1785.
 - 1. PVC, Schedule 80 Socket Fittings: ASTM D 2467.

2.2 CORROSION-PROTECTION PIPING ENCASEMENT

- A. Encasement for Underground Metal Piping:
 - 1. Standards: ASTM A 674 or AWWA C105.
 - 2. Form: Sheet or tube.
 - 3. Material: LLDPE film of 0.008-inch minimum thickness, or high-density, cross laminated PE film of 0.004-inch minimum thickness.
 - 4. Color: Natural.

2.3 GATE VALVES

- A. AWWA, Cast-Iron Gate Valves:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. McWane, Inc.; Clow Valve Co.
 - b. Mueller Company
 - c. M. & H.
 - d. McWane, Inc.; Kennedy Valve Co.
 - e. Waterous
 - f. Kennedy
- B. UL/FMG, Cast-Iron Gate Valves:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. McWane, Inc.; Clow Valve Co.
- b. Mueller Company
- c. M. & H.
- d. McWane, Inc.; Kennedy Valve Co.
- e. Waterous

2.4 GATE VALVE ACCESSORIES AND SPECIALTIES

- A. Valve Boxes: Comply as indicated on the Drawings.
- B. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve. Indicator Posts shall include tamper switch and wiring meeting the requirement of the Fire Department having jurisdiction. Install tamper switch conduit and wiring as indicated on the Drawings.

2.5 CHECK VALVES

- A. AWWA Check Valves:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. McWane, Inc.; Clow Valve Co.
 - b. McWane, Inc.; Kennedy Valve Co.
 - c. McWane, Inc.; M&H Valve Co.
 - d. Mueller Co.; Water Products Div.
 - 2. Description: Swing-check type with resilient seat. Include interior coating according to AWWA C550 and ends to match piping.
 - a. Standard: AWWA C508.
 - b. Pressure Rating: 250 psig, 175 psig.

2.6 WATER METERS

- A. New site water service will be connected to existing metered service line. No meter needed for domestic water.

2.7 BACKFLOW PREVENTERS

- A. New site water service will be connected to existing metered service line per plan. No Backflow Preventers needed for domestic water.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Refer to Section 31 2000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
- C. Do not use flanges or unions for underground piping.
- D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- E. Underground water-service piping 3/4" to 3" shall be the following:
 - 1. PVC, Schedule 40 pipe; PVC, Schedule 40 socket fittings; and solvent-cemented joints.
- F. Underground water-service piping 4" to 12" shall be the following:
 - 1. PVC, AWWA C900-07, Class 235, DR-18 pipe; fittings shall have a minimum working pressure of 350 psi and shall conform to either AWWA C110 or AWWA C153 with "Ring-Tite" ends or approved equal and push-on joint ends for cast iron, ductile iron or polyvinyl chloride pipe. Fitting shall have a 1/16" minimum cement-mortar lining conforming to AWWA C104; and gasketed joints.
- G. Aboveground Water-Service Piping 3/4" to 3" shall be any of the following:
 - 1. Hard copper tube, ASTM B 88, Type K; copper, pressure-seal fittings; and pressure-sealed joints.
 - 2. PVC, Schedule 80 pipe; PVC, Schedule 80 socket fittings; and solvent-cemented joints.
- H. Aboveground water-service piping 4" to 12" shall be the following:
 - 1. Ductile-iron, grooved-end pipe; ductile-iron, grooved-end appurtenances; and grooved joints.

3.3 VALVE APPLICATIONS

- A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG,

nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 and smaller installation.

- B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Use the following for valves in vaults and aboveground:
 - a. Check Valves: AWWA C508 or UL/FMG, swing type.
 - 2. Relief Valves: Use for water-service piping in vaults and aboveground.

3.4 PIPING INSTALLATION

- A. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.
- B. Make connections NPS 2 and smaller with drilling machine according to the following:
 - 1. Install curb valve in water-service piping with head pointing up and with service box.
- C. Bury piping with a minimum depth of cover over top of pipe to the following:
 - 1. Under Traffic Areas: NPS 1 to NPS 4 - 24 inches, NPS 6 to NPS 10 - 36 inches, NPS 12 - 42 inches.
 - 2. Under Non-Traffic Areas: NPS 1 to NPS 4 - 18 inches, NPS 6 to NPS 12 shall comply with the requirements for Traffic Areas above.
- D. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- E. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
 - 1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
- F. Due to the scale of the drawings, it is not possible to indicate all offsets, fittings, etc., which may be required. It shall be the responsibility of the contractor to review the Drawings and furnish all fittings, etc. necessary to complete the work.
- G. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

3.5 JOINT CONSTRUCTION

- A. Make pipe joints according to the following:
 - 1. Copper-Tubing, Pressure-Sealed Joints: Use proprietary crimping tool and procedure recommended by copper, pressure-seal-fitting manufacturer.
 - 2. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
 - a. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
 - 3. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
 - a. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.

3.6 ANCHORAGE INSTALLATION

- A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages that may be used include the following:
 - 1. Concrete thrust blocks.
- B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
 - 1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
- C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.7 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
- B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.
- C. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.

3.8 WATER METER INSTALLATION

- A. New site water service will be connected to existing metered service line. No meter needed for domestic water.

3.9 BACKFLOW PREVENTER INSTALLATION

- A. New site water service will be connected to existing metered service line. No Backflow Preventer needed for domestic water.

3.10 CONNECTIONS

- A. Connect water-distribution piping to existing site water.
- B. Connect wiring according to Section 26 0519 "Low-Voltage Electrical Power Conductors and Cables."

3.11 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.
 - 1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
- C. Prepare reports of testing activities.
- D. Additional construction, testing and replacement costs resulting from damaged or improperly installed infrastructure shall be borne by the Contractor.

3.12 IDENTIFICATION

- A. Install continuous underground warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Section 31 2000 "Earth Moving."
- B. Tracer Wire: At all non-ferrous pipes, install 10 GA. solid copper wire with 45 mils of high molecular weight polyethylene (HMWPE) insulation, UL listed, rated for direct burial, color blue.
 - 1. Tracer wire access points shall be accessible at all new water valve boxes, water meter boxes, blowoffs, and fire hydrants.
 - 2. Tracer wire shall be laid flat and securely affixed to the pipe with tape at 7 feet intervals. The wire shall be protected from damage during the execution of the works. No breaks

or cuts in the tracer wire or tracer wire insulation shall be permitted. At water service saddles, the tracer wire shall not be allowed to be placed between the saddle and the water main.

3. At all water main end caps, a minimum of 6 feet of tracer wire shall be extended beyond the end of the pipe, coiled and secured to the cap for future connections. The end of the tracer wire shall be spliced to the wire of a six pound zinc anode and is to be buried at the same elevations as the water main.
4. Connectors:
 - a. All mainline wires must be interconnected at intersections, at mainline tees and mainline crosses as indicated on the drawings.

3.13 CLEANING

A. Clean and disinfect water-distribution piping as follows:

1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
 - a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
 - b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
 - c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

B. Prepare reports of purging and disinfecting activities.

END OF SECTION 22 1113

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SECTION 22 1313-FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipe and fittings.
 - 2. Nonpressure and pressure couplings.
 - 3. Cleanouts.
 - 4. Encasement for piping.
 - 5. Manholes.

1.3 DEFINITIONS

- A. PVC: Polyvinyl Chloride Plastic.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Piping Material.
 - 2. Fittings.
 - 3. Manholes, including frames and covers.
 - 4. Cleanouts.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.

1.7 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Construction Manager and City of Tulare no fewer than two days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of service without Construction Manager's written permission and approval from the City of Tulare.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

- A. PVC Type PSM Sewer Piping NPS 4 to NPS 15:
 - 1. Pipe: ASTM D 3034, SDR 35 or SDR 26 as indicated on Drawings, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
 - 2. Fittings: ASTM D 3034, PVC with bell ends.
 - 3. Gaskets: ASTM F 477, elastomeric seals.
- B. PVC Gravity Sewer Piping NPS 18 to NPS 36:
 - 1. Pipe and Fittings: ASTM F 679, Min. 46 psi Pipe Stiffness, PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM F 477, elastomeric seals for gasketed joints.

2.2 NONPRESSURE-TYPE TRANSITION COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:

1. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Unshielded, Flexible Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dallas Specialty & Mfg. Co.
 - b. Fernco, Inc
 - c. Logan Clay Pipe.
 - d. Mission Rubber Company; a division of MCP Industries, Inc.
 - e. NDS.
 - f. Plastic Oddities; a division of Diverse Corporate Technologies, Inc.
2. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Shielded, Flexible Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cascade Waterworks Mfg.
 - b. Dallas Specialty & Mfg. Co.
 - c. Mission Rubber Company; a division of MCP Industries, Inc.
2. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

E. Ring-Type, Flexible Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fernco, Inc.
 - b. Logan Clay Pipe.
 - c. Mission Rubber Company; a division of MCP Industries, Inc.
2. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.3 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.

2.4 MANHOLES

A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with rubber gasket joints.
2. Diameter: 48 inches minimum unless otherwise indicated.
3. Base: Cast-in-place concrete as indicated on drawings.
4. Top Section: Concentric-cone with top of cone of size that matches grade rings.
5. Joint Sealant: ASTM C 990, bitumen or butyl rubber. Joints shall be water-tight.
6. Reinforced-concrete rings, 9 to 18-inch total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.

B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch ID by 4 to 6-inch riser, with 4-inch minimum-width flange and 25-1/4 to 26-inch diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "SANITARY SEWER."
2. Material: ASTM A 48/A 48M, Class 35 gray iron unless otherwise indicated.

2.5 CONCRETE

A. General: Cast-in-place concrete complying with ACI 318, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix for Cast in Place Concrete: Class 3 Concrete, 2500 psi minimum at 28 days, with 0.50 maximum water/cementitious materials ratio unless noted otherwise on the Drawings.

1. Reinforcing Bars: ASTM A 615, Grade 60 deformed steel.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 31 2000 "Earth Moving."

3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Due to the scale of the drawings, it is not possible to indicate all offsets, fittings, etc., which may be required. It shall be the responsibility of the contractor to review the Drawings and furnish all fittings, etc. necessary to complete the work.
- C. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
- D. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- E. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- F. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- G. Install gravity-flow, nonpressure, drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow, at minimum slope as indicated on drawings.
 - 2. Install piping with 36-inch minimum cover.
 - 3. Install PVC Type PSM sewer piping according to ASTM D 2321 and ASTM F 1668.
 - 4. Install PVC gravity sewer piping according to ASTM D 2321 and ASTM F 1668.
- H. Install corrosion-protection piping encasement over the following underground metal piping according to ASTM A 674 or AWWA C105:
 - 1. Hub-and-spigot, cast-iron soil pipe.
 - 2. Hubless cast-iron soil pipe and fittings.
 - 3. Ductile-iron pipe and fittings.
 - 4. Expansion joints and deflection fittings.

- I. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure, drainage piping according to the following:
 1. Join PVC Type PSM sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
 2. Join PVC gravity sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
 3. Join dissimilar pipe materials with nonpressure-type, flexible or rigid couplings.
- B. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
 1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
 - a. Shielded flexible couplings for pipes of same or slightly different OD.
 - b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
 - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.4 MANHOLE INSTALLATION

- A. General: Install manholes complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Install FRP manholes according to manufacturer's written instructions.
- D. Form continuous concrete channels and benches between inlets and outlet.
- E. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.

3.5 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.6 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Pipe branches for cleanouts and riser extensions shall match mainline specifications. Install piping so cleanouts open in direction of flow in sewer pipe.
 - 1. Use Heavy-Duty, top-loading classification cleanouts in all areas except vehicle-traffic service areas and roads.
 - 2. Use Extra-Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas and roads.
- B. Set cleanout frames and covers outside of paved areas as indicated on the Drawings.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.7 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains specified in Section 22 1316 "Sanitary Waste and Vent Piping."
- B. Make connections to existing piping and underground manholes.
 - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 2500 psi.
 - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 2500 psi.
 - 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
 - a. Use concrete that will attain a minimum 28-day compressive strength of 2500 psi unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

4. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.8 IDENTIFICATION

- A. Comply with requirements in Section 31200 "Earth Moving" for underground utility identification devices. Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
 1. Use detectable warning tape over ferrous piping.
 2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.9 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 1. Submit separate report for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - 1) Mandril Tests: Upon completion of backfill and compacting trenches, the contractor, at his own expense shall pull a properly sized mandril through the installed main lines, 8 inches inside diameter and larger, to demonstrate that the maximum pipe deflection does not exceed 5%. If excessive pipe deflection obstructs passage of the mandril, the contractor shall excavate and make suitable repairs.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 4. Submit separate report for each test.
 5. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, and the following:
 - a. Test plastic gravity sewer piping according to UNI-B-6 or ASTM F 1417.
 6. Manholes: Perform exfiltration hydraulic test according to ASTM C 969.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.
- E. Additional construction, testing, and replacement costs resulting from damaged or improperly installed infrastructure shall be paid for by the Contractor.
- 3.10 CLEANING
- A. Clean dirt and superfluous material from interior of piping.

END OF SECTION 22 1313

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SECTION 230100 – GENERAL MECHANICAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section covers and applies to all work included in Divisions 21 through 25.
- B. Work in this Section includes providing labor, materials, equipment, services necessary, fabrication, installation and testing for fully operational and safe systems including all necessary materials, appurtenances and features whether specified or shown in the contract documents or not, in conformity with all applicable codes and authorities having jurisdiction for the following:
 - 1. Mechanical work covered by all sections within Divisions 21, 22, 23 and 25 of the specifications, including, but not limited to:
 - a. Heating, ventilating and air conditioning systems and equipment.
 - b. Plumbing systems and equipment.
 - c. Fire protection systems and equipment
 - d. Control systems.
 - e. Testing and balancing.
- C. Provide cutting and patching, for the Mechanical Work.
- D. Provide piping from plumbing terminations, 10 feet from equipment, for water, gas, sanitary sewer and waste.
- E. Provide drain piping for all equipment requiring drainage to floor drains, roof, sink, or funnel drains.

1.3 RELATED WORK AND REQUIREMENTS

- A. Carefully check the documents of each section with those of other sections and Divisions. Ascertain the requirements of any interfacing materials or equipment being furnished and/or installed by those sections and Divisions, and provide the proper installation and/or required interface.

1.4 QUALITY ASSURANCE

- A. Supply all equipment and accessories in compliance with the applicable standards listed in article 1.6 of this section and with all applicable national, state and local codes.
- B. All items of a given type shall be the products of the same manufacturer, unless otherwise specified herein.

1.5 SUBMITTALS

- A. Submit shop drawings, product data, samples and certificates of compliance required by Division 01.
- B. Product Data Submittals: Submit manufacturers standard published data. Mark each copy to identify applicable products, models, options, accessories and other data. Supplement manufacturers standard data to provide information specific to this project.
- C. Organize submittals in sequence according to Specification Section. Submit in single electronic PDF document with tabs identifying each Specification Section. Provide Table of Contents identifying the Specification Sections being submitted and the contents within each tabbed section. Prepare Submittals in multiple volumes if required. Provide a complete Submittal package by Division at one time. Do not submit individual Sections piecemeal.
- D. In addition to the submittal requirements of Divisions 21, 22, 23 and 25, submit product data for the following items per the provisions Division 01:
 - 1. All Equipment and Fixtures indicated in Schedules on Drawings.
 - 2. Access panels
- E. If more than two submissions are required (initial submittal and one resubmittal) based on rejection or lack of compliance by submittal, then the Contractor shall:
 - 1. Arrange for additional reviews by the Design Engineers.
 - 2. Pay all costs for such additional reviews.
- F. Corrections or comments made on the shop drawings during review do not relieve the Contractor from compliance with requirements of the drawings and specifications. Shop drawing checking by the Engineer is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The Contractor is responsible for:
 - 1. Confirming and correlating all quantities and dimensions.
 - 2. Selecting fabrication processes and techniques of construction.
 - 3. Coordinating his work with that of all other trades.

4. Performing his work in a safe and satisfactory manner.

G. Substitutions:

1. Prior to Bid shall be in accordance with Division 01.
2. After award of contract, submit separate substitution request for each substitution in accordance with the requirements hereinbelow. Support each request with:
 - a. Complete data substantiating compliance of proposed substitution with requirements stated in Contract documents.
 - b. Data relating to changes in construction schedule.
 - c. Any effect of substitution on other Work in this and other Divisions, and any other related contracts, and changes required in other work or products.
3. Contractor shall be responsible at no extra cost to Owner for any changes resulting from proposed substitutions which affect work of other Sections or Divisions, or related contracts.
4. Claims for additional costs caused by substitution that may subsequently become apparent shall be met by the Contractor.
5. Failure by the Contractor to order materials or equipment in a timely manner will not constitute justification for a substitution.
6. Substitutions will not be considered for acceptance when acceptance will require revision of Contract Documents, unless Contractor bears cost of redesign.
 - a. Arrange for required redesign by Engineer.
 - b. Pay all costs for such redesign.
 - c. All subject to Architect's approval.
7. Approval of substitutions shall not relieve Contractor from full compliance with requirements of Contract documents.

H. As-built (Record) Drawings:

1. Shall be in accordance with Division 01.
2. Provide after installation is complete. Final signoff and Client acceptance will not occur prior to submission of As-built drawings to Architect/Engineer.
3. Indicate as-built conditions and all revisions, fully illustrating all revisions made by all trades in the course of work.
4. Dimension physical locations of ductwork, and piping with reference elevations

and distances above finished floors, below beams, from wall faces, underground (invert elevations) and from column lines.

5. Exact location, type and function of concealed valves, dampers, controllers, piping, air vents, piping drains and isolators.
6. Indicate all equipment sizes and capacities and tag numbers.
7. Provide drawing on reproducible bond.
8. These drawings shall be for as-built record purposes for the Owner's use and are not considered shop drawings.

I. Operating Instructions, Maintenance Manuals and Parts Lists:

1. Before requesting acceptance of work, submit one set for review by Architect/Engineer.
2. After review, furnish two (2) printed and bound sets.
3. Include:
 - a. Installers name, address, telephone number and representatives name, and website address.
 - b. Manufacturer's name, model number, service manual, spare-parts list, and descriptive literature for all components, cross referenced and numbered on Record Drawings, and in accordance with Title 24 as required.
 - c. Maintenance instructions.
 - d. Listing of possible breakdown and repairs.
 - e. Instruction for starting, operation and programming.
 - f. Detailed and simplified one line, color coded flow and wiring diagram.
 - g. Field test report, including:
 - 1) Instrument set points.
 - 2) Normal operating values.
 - h. Name, address and phone number of contractors equipment suppliers and service agencies.
 - i. Assemble manufacturer's equipment manuals in chronological order, following the specification alpha-numeric system, in heavy duty 3-ring binders clearly titled on the spine and front cover with appropriate index dividers.

J. Special Tools:

1. One set of any special tools required to operate, adjust, dismantle or repair equipment furnished under any section of this Division.
2. "Special tools": those not normally found in possession of mechanics or maintenance personnel.
3. Tag each item and cross reference in Maintenance Manual.
4. Turn over to Owner's representative or temporarily secure to unit at Architect's instruction.

K. Quantity of Submittals Required:

1. Product Data (brochures):
 - a. Submit electronic PDF copy of product data.
 - b. If comments are required, comment sheet(s) will be returned with submittal.
2. Samples:
 - a. Submit as required in each specification section.

1.6 REFERENCE STANDARDS

- A. Reference standards of industry organizations, manufacturer associates and professional associations that publish standards of construction and/or materials that are referenced in this Division are listed in Division 01. The Standards as referenced in this Specification shall be considered as attached and binding to the requirements of the Construction Documents. The Contractor is to be considered as knowledgeable of these Standards and their requirements for the performance of the Work.

1.7 CODE COMPLIANCE

- A. In addition to complying with all other legal requirements, comply with current provisions of governing codes and regulations in effect during progress of the Work, and with the following:
1. Drawings and specification requirements shall govern where they exceed Code and Regulation requirements.
 2. Where requirements between governing Codes and Regulations vary, the more restrictive provisions shall apply.
 3. Nothing contained in Contract Documents shall be construed as authority or permission to disregard or violate legal requirements. The Contractor shall

immediately draw the attention of the Architect to any such conflicts noted in the Contract Documents.

1.8 DESCRIPTION OF BID DOCUMENTS

A. General:

1. Words or phrases such as "The Contractor shall," "shall be," "furnish," provide," "connect," "a," "an," "the," and "all" etc. may be omitted for brevity.
2. The Drawings and Specifications are complimentary each to the other. Where discrepancies occur between the Drawings and Specifications, the more stringent provisions shall apply.
3. Examine all drawings and specifications prior to bidding the work. Report any discrepancies to the Engineer.

B. Specifications:

1. Specifications, in general, describe quality and character of materials and equipment and the Standards that govern. Contractor is responsible for design and construction costs incurred for equipment and materials other than the Basis of Design, including but not limited to architectural, structural, electrical, HVAC, fire sprinkler and plumbing.
2. Specifications are of simplified form and include incomplete sentences.

C. Drawings:

1. Drawings in general are diagrammatic and indicate scope, sizes, routing, locations, connections to equipment and methods of installation, but not necessarily offsets, obstructions or structural conditions. Drawings are not intended to show every item, fitting, transition or offset in its exact dimension or detail of equipment or proposed system layout. Locations on drawings may be distorted for purposes of clearness and legibility.
2. Contractor to provide additional offsets, fittings, hangers, supports, valves, drains as required for construction and coordination with work of other trades.
3. Before proceeding with work, ordering or fabricating materials, check and verify all dimensions and carefully check space requirements with other Work to ensure that all equipment and materials can be installed in spaces allotted.
4. Contractor to assume all responsibility for fitting of materials and equipment to other parts of equipment and structure.
5. The Contractor is responsible for installing the work in such a manner that it will conform to the structure and architectural elements, avoid obstructions, maintain headroom, leave adequate clearance for proper maintenance and repairs, and provide clearances and access required by codes. Do not scale distances off of

mechanical drawings. Use actual field measured building dimensions.

6. Make adjustments that may be necessary or requested in order to resolve space problems, preserve headroom, and avoid architectural openings, structural members and work of other trades.
 7. Above items to be performed at no additional cost to the Owner.
- D. Typical details, where shown on the drawings, apply to each and every item of the project where such items are applicable. Typical details are not repeated in full on the plans, and are diagrammatic only, but with the intention that such details shall be incorporated in full.

1.9 DEFINITIONS

- A. "Piping": pipe, tube, fittings, flanges, valves, controls, strainers, hangers, supports, unions, traps, drains, insulation, and related items.
- B. "Motor Controllers": manual or magnetic starters (with or without switches), individual pushbuttons or hand-off-automatic (HOA) switches controlling the operation of motors.
- C. "Control" or "Actuating Devices": automatic sensing and switching devices such as thermostats, pressure, float, electro-pneumatic switches and electrodes controlling operation of equipment.

1.10 JOB CONDITIONS

- A. Adjoining work of other Divisions shall be examined for interferences and conditions affecting this Division.
- B. Examine site related work and surfaces before starting work of any Section.
 1. Report to Architect, in writing, conditions which will prevent proper provision of this work.
 2. Beginning work of any Section without reporting unsuitable conditions to Architect constitutes acceptance of conditions by Contractor.
 3. Perform any required removal, repair or replacement of this work caused by unsuitable conditions at no additional cost to Owner.
- C. Connections to existing work.
 1. Unknown conditions will be addressed if reasonable.
 2. Contractor shall field verify existing dimensions prior to ordering or fabricating materials.
 3. Install new work and connect to existing work with minimum interference to

existing facilities.

4. Temporary shutdowns of existing services:
 - a. At no additional charges.
 - b. At times not to interfere with normal operation of existing facilities.
 - c. Provide 48 hour notification.
5. Maintain continuous operation of existing facilities as required with necessary temporary connections between new and existing work.
6. Restore existing disturbed work to original condition.

D. Removal and relocation of existing work.

1. Disconnect, remove or relocate material, equipment, plumbing fixtures, piping and other work noted and required by removal or changes in existing construction.
2. Where existing pipes, conduits and/or ducts which are to remain prevent installation of new work as indicated, relocate, or arrange for relocation, of existing pipes, conduits and/or ducts.
3. Provide new material and equipment required for relocated equipment.
4. Plug or cap active piping or ductwork behind or below finish.
5. Do not leave long dead-end branches. Cap or plug as close as possible to active line.
6. Remove unused piping, ductwork and material.
7. Dispose of removed fixtures and equipment as directed.
8. Turn over removed fixtures and equipment to Owner as directed.

E. Special Traffic Requirements:

1. Maintain emergency and service entrances useable to pedestrian, truck, and ambulance traffic at all times.
2. Where trenches are cut, provide adequate bridging for above-mentioned traffic.

1.11 TEMPORARY FACILITIES

- A. See Division 01 for temporary facilities required.

1.12 SCHEDULE OF WORK

- A. Arrange work to conform to schedule of construction established or required to comply with Contract Documents.
- B. In scheduling, anticipate means of installing equipment through available openings in structure.
- C. Confirm in writing to Architect, within 30 days of signing of contract, anticipated number of days required to perform test, balance, and acceptance testing of mechanical systems:
 - 1. This phase must occur after completion of mechanical systems, including all control calibration and adjustment, and requires substantial completion of the building, including closure, ceilings, lighting, partitioning, etc.
 - 2. Submit for approval at this time, names and qualifications of test and balancing agencies to be used.

1.13 NOISE REDUCTION

- A. Cooperate in reducing objectionable noise or vibration caused by mechanical systems.
 - 1. To extent of adjustments to specified and installed equipment and appurtenances.
- B. Correct noise problems caused by failure to install work in accordance with Contract Documents. Include labor and materials required as result of such failure.

PART 2 - PRODUCTS

2.1 ACCESS DOORS

- A. Size for proper access, adjusting and maintenance:
 - 1. 12 in. x 12 in. minimum for valves, trap primers, shock absorbers, etc.
 - 2. 24 in. x 24 in. for man access to concealed fans, coils, etc., unless indicated otherwise.
- B. Provide as required by work in this Division.
- C. Style, Color and Finish to match adjacent construction and as approved by Architect.

PART 3 - EXECUTION

3.1 MANUFACTURER'S RECOMMENDATIONS

- A. All material, equipment, devices, etc., shall be installed in accordance with the recommendations of the manufacturer of the particular item. The Contractor shall be responsible for all installations contrary to the manufacturer's recommendations. The Contractor shall make all necessary changes and revisions to achieve such compliance. Manufacturer's installation instructions shall be delivered to and maintained at the job site through the construction of the project.

3.2 CUTTING AND PATCHING

- A. All carpentry, cutting and patching to be done under trades doing that work. Work shall be done in accordance with Division 01.
- B. Provide all carpentry, cutting and patching required for proper installation of material and equipment specified in Divisions 21, 22, 23 and 25.
- C. Do not cut, notch or drill structural members without consent of Architect.
- D. All cutting and repairing shall conform to Title 21 of California Administrative Code.

3.3 CONCRETE ANCHORS

- A. Steel bolt with expansion anchor requiring a drilled hole – powder driven anchors are not acceptable.
- B. Minimum concrete embedment shall be 4-1/2 diameters unless otherwise noted on plans.
- C. Minimum spacing shall be 12 diameters center to center and 6 diameters center to edge of concrete unless otherwise noted on plans.
- D. Maximum allowable stresses for tension and shear shall be 80% of the of the ICC Evaluation Service Report (ESR) values. Minimum concrete embedment shall be the nominal embedment listed in the ESR Table. Hilti Kwik Bolt TZ2.

3.4 EQUIPMENT ANCHORING

- A. All equipment shall be securely anchored in accordance with CBC.
- B. All equipment mounted on concrete shall be secured with a concrete anchor as specified above at each mounting point.
- C. Secure base plate as indicated above.

3.5 SUPPORTS AND SEISMIC RESTRAINTS

- A. All mechanical systems (all ductwork, piping, etc.) shall be provided with supports and seismic restraints in accordance with the CBC. Submit anchorage calculations and details stamped and signed by a structural engineer registered in the State of California. Submit

shop drawings showing location, type, and detail of restraints. Submit manufacturer's data for restraints. Restraint system shall be Mason West, Inc. (OSHPD OPM 0043-13).

3.6 WATER PROOFING

- A. Under General Construction Work.
- B. Where any work pierces waterproofing, installation shall be subject to review.
 - 1. Provide all necessary sleeves, caulking, flashing and flashing fittings required to make openings absolutely watertight.
- C. Flashing:
 - 1. Mechanical Contractor shall provide flashing for all work in this Division, unless otherwise provided by roofing installer, as required to accommodate roof slope, roofing material, and roof installation method. No additional costs will be paid for lack of familiarity of Contractor with roofing type or slope.
 - 2. Mechanical Contractor shall be responsible for coordinating size of penetrations and locations with roofing contractor.
 - 3. Mechanical Contractor shall be responsible for scheduling installation of piping and other penetrations through roof structural system to exterior that they are complete and secure for the orderly installation of the roofing system.
 - 4. 4 lb. lead.
 - 5. 16 oz. lead coated copper.
 - 6. No.22 USSG aluminum.
 - 7. Fittings for piping through roof:
 - a. Galvanized cast iron bottom recess roof type.
 - b. Similar to Josam No. 26440 or No. 26450.
- D. Provide weather protection canopies, hoods or enclosures over out-of-door equipment which could be damaged by exposure to weather.
 - 1. This requirement applies to:
 - a. Motors and drives.
 - b. Controls.
 - c. Instruments.
 - 2. Identify items under such covers if entirely enclosed.

3.7 ACCESS TO VALVES AND EQUIPMENT

- A. Access shall be possible where valves, expansion joints, fire dampers, motors, filters, control devices, and any other equipment requiring access for servicing, repairs, or maintenance are located in walls, soffits, chases, and/or above ceilings.
- B. Definition of Accessible:
 - 1. Valves and dampers may be operated.
 - 2. Control devices may be adjusted.
 - 3. Fire dampers may be reset.
 - 4. Equipment access panels may be opened.
 - 5. Normal maintenance work such as replacement of filters, lubrication of bearings, etc., may be performed readily within arm's reach of access opening.
 - 6. It shall not be necessary to crawl through furred ceiling space to perform such operations.
- C. Install piping, equipment and accessories to permit easy access for maintenance.
- D. Group concealed valves, expansion joints, controls, dampers and equipment requiring service access, so as to be freely accessible through access doors and to minimize the number of access doors required.
- E. Relocate piping equipment and accessories as required, at no extra cost to afford proper maintenance access.
- F. Coordinate location of access panels with applicable trades installing walls or ceiling.
 - 1. Coordinate panel locations with lights and other architectural features.
 - 2. Submit proposed panel locations to Architect for review.
- G. Arrange for location and marking of removable tiles in splined ceilings where access panels are not installed.
- H. Existing Structures:
 - 1. When installation requires access openings through existing construction, coordinate location of necessary access panels, and arrange for respective trades to provide openings and framing which may be required.
 - 2. Restore adjoining existing surfaces to original condition after new access panels have been installed.

3.8 CLEANING AND ADJUSTING

- A. Work to be painted: Brush and clean work prior to concealing, painting and acceptance. Perform in stages if directed.
- B. Painted or exposed work soiled or damaged: Clean, repair and paint to match adjoining work before final acceptance.
- C. Remove debris from inside and outside of materials and equipment.
- D. Flush out piping after installation.
- E. Adjust valves and automatic control devices.
- F. Traps, wastes and supplies: unobstructed.

3.9 FIELD QUALITY CONTROL

- A. Refer to Division 01.
- B. Tests:
 - 1. Perform as specified in individual Divisions, and as required by authorities having jurisdiction.
- C. Furnish written report and certification that tests have been satisfactorily completed.
- D. Repair or replace defective work, as directed.
- E. Pay for restoring or replacing damaged work due to tests, as directed.
- F. Pay for restoring or replacing damaged work of others, due to tests, as directed.

3.10 TRAINING

- A. Provide training by qualified manufacturers' representatives for equipment as specified in this Division.
- B. Training to include:
 - 1. Site-specific training.
 - 2. Minimum hours as specified in each Section.
 - 3. Training materials (minimum six sets).
 - 4. Electronic media available from the manufacturer [two (2) copies].
- C. Each training session to be scheduled with Owner at least 30 days in advance.

END OF SECTION

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SECTION 23 05 00 – COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Mechanical sleeve seals.
3. Sleeves.
4. Escutcheons.
5. Equipment installation requirements common to equipment sections.
6. Painting and finishing.
7. Supports and anchorages.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for plastic materials:
 1. CPVC: Chlorinated polyvinyl chloride plastic.
 2. PE: Polyethylene plastic.
 3. PVC: Polyvinyl chloride plastic.
- G. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.4 SUBMITTALS

- A. Product Data: For the following:
 1. Mechanical sleeve seals.
 2. Access doors
- B. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for HVAC items requiring access that are concealed behind finished surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

- A. Refer to individual Division 23 piping Sections for special joining materials not listed below.
- B. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- C. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAgl, silver alloy for refrigerant piping, unless otherwise indicated.

2.4 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
- B. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
- C. Pressure Plates: Carbon steel or Stainless steel. Include two for each sealing element.
- D. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.5 SLEEVES

- A. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- B. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

- C. PVC Pipe: ASTM D 1785, Schedule 40.

2.6 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
 - 1. Finish: Polished chrome-plated.
- D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
 - 1. Finish: Polished chrome-plated.

2.7 ACCESS DOORS

- A. Size for proper access, adjusting and maintenance:
 - 1. 12 in. x 12 in. minimum for valves, volume dampers, etc.
 - 2. 24 in. x 24 in. for man access to concealed fans, coils, fire/smoke dampers, etc., unless indicated otherwise.
- B. Provide as required by work in Division 21, 22, 23, and 25.
- C. Style, color, and finish to match adjacent construction and as approved by Architect.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors.
- M. Sleeves are not required for core-drilled holes.
- N. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
 - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - 3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. PVC or Steel Pipe Sleeves: For pipes smaller than NPS 6.
 - 1) Seal space outside of sleeve fittings with grout.
 - 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint.
- O. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - 1. Install steel pipe for sleeves smaller than 6 inches in diameter.
 - 2. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten

bolts against pressure plates that cause sealing elements to expand and make watertight seal.

- P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
- Q. Verify final equipment locations for roughing-in.
- R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

3.3 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 - 1. Install unions, in piping NPS 2-1/2 and smaller, adjacent to each valve and at final connection to each piece of equipment.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

3.5 ACCESS TO VALVE AND EQUIPMENT

- A. Access shall be possible where valves, expansion joints, fire dampers, motors, filters, control devices, and any other equipment requiring access for servicing, repairs, or maintenance are located in walls, soffits, chases, and/or above ceilings.
- B. Definition of Accessible:
 - 1. Valves and dampers may be operated.
 - 2. Control devices may be adjusted.
 - 3. Fire dampers may be reset.
 - 4. Equipment access panels may be opened.
 - 5. Normal maintenance work such as replacement of filters, lubrication of bearings, etc., may be performed readily within arm's reach of access opening.
 - 6. It shall not be necessary to crawl through furred ceiling space to perform such operations.
- C. Install piping, equipment and accessories to permit easy access for maintenance.
- D. Group concealed valves, expansion joints, controls, dampers and equipment requiring service access, so as to be freely accessible through access doors and to minimize the number of access doors required.
- E. Relocate piping equipment and accessories as required, at no extra cost to afford proper maintenance access.
- F. Coordinate location of access panels with applicable trades installing walls or ceiling.
 - 1. Coordinate panel locations with lights and other architectural features.
 - 2. Submit proposed panel locations to Architect for review.
- G. Arrange for location and marking of removable tiles in splined ceilings where access panels are not installed.

3.6 PAINTING

- A. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.
- B. Field Welding: Comply with AWS D1.1.

3.8 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor HVAC materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

END OF SECTION

SECTION 23 05 13 – COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 - 1. Motor controllers.
 - 2. Torque, speed, and horsepower requirements of the load.
 - 3. Ratings and characteristics of supply circuit and required control sequence.
 - 4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

- A. Comply with requirements in this Section except when stricter requirements are specified in HVAC equipment schedules or Sections.
- B. Comply with NEMA MG 1 unless otherwise indicated.
- C. Comply with IEEE 841 for severe-duty motors.

2.2 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.
- B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Energy efficient, as defined in NEMA MG 1.
- C. Service Factor: 1.15.
- D. Multispeed Motors: Variable torque.
 - 1. For motors with 2:1 speed ratio, consequent pole, single winding.
 - 2. For motors with other than 2:1 speed ratio, separate winding for each speed.
- E. Multispeed Motors: Separate winding for each speed.
- F. Rotor: Random-wound, squirrel cage.
- G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- H. Temperature Rise: Match insulation rating.
- A. Insulation: Class F.
- B. Code Letter Designation:
 - 1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
 - 2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
- C. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
 - 1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
 - 2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
 - 3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
 - 4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
- C. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.5 SINGLE-PHASE MOTORS

- A. Motors larger than 1/20 hp shall be DC electronic commutation type (ECM) specifically designed for fan applications. Prewired to the specific voltage and phase. Internal motor shall convert AC supplied to the fan to DC power to operate the motor. Motor shall be controllable down to 20% of full speed. Speed shall be controlled by either potentiometer dial mounted on the motor or by a 0-10 VDC signal. Motor shall be a minimum of 85% efficient at all speeds.
- B. Bearings: Permanently lubricated, heavy duty ball bearings suitable for radial and thrust loading.
- C. Motors 1/20 HP and Smaller: Shaded-pole type.
- D. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

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SECTION 23 05 29 – HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.
5. Equipment supports.

1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE 7-16.
1. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
 3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.2 TRAPEZE PIPE HANGERS

- #### A.
- Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 THERMAL-HANGER SHIELD INSERTS

- #### A.
- Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig (688-kPa) or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength and vapor barrier.
- #### B.
- Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass with 100-psig (688-kPa) or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength.
- #### C.
- For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- #### D.
- For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- #### E.
- Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

2.4 FASTENER SYSTEMS

- A. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.5 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.6 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 - 2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- D. Fastener System Installation:
 - 1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

- F. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- H. Install lateral bracing with pipe hangers and supports to prevent swaying.
- I. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- J. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- K. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- L. Insulated Piping:
 - 1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
 - 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
 - b. NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
 - 5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches (40 mm).

3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports and metal trapeze pipe hangers and attachments for general service applications.
- F. Use stainless-steel pipe hangers and stainless-steel attachments for hostile environment applications.
- G. Use padded hangers for piping that is subject to scratching.
- H. Use thermal-hanger shield inserts for insulated piping and tubing.
- I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
 - 2. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36 (DN 20 to DN 900), requiring clamp flexibility and up to 4 inches (100 mm) of insulation.
 - 3. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
 - 4. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
 - 5. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30 (DN 25 to DN 750), from two rods if longitudinal movement caused by expansion and contraction might occur.
- J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24 (DN 24 to DN 600).
- K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
- L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 3. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 4. C-Clamps (MSS Type 23): For structural shapes.
 5. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
- M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- N. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION

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SECTION 23 05 53 – IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.

1.2 SUBMITTAL

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Brass, 0.032-inch (0.8-mm) or anodized aluminum, 0.032-inch (0.8-mm) minimum thickness and having predrilled or stamped holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
3. Minimum Letter Size: 1/2 inch (13 mm). Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Fasteners: Stainless-steel rivets or self-tapping screws.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch (3.2 mm) thick, and having predrilled holes for attachment hardware.
2. Letter Color: Black.
3. Background Color: White.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
6. Minimum Letter Size: 1/2 inch (13 mm). Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.

- C. Label Content: Include equipment's Drawing designation or unique equipment number, and Room number of primary space served (where thermostat is located). Coordinate with District to match final installed room numbering.
- D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch (A4) bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch (3.2 mm) thick, and having predrilled holes for attachment hardware.
- B. Letter Color: Red.
- C. Background Color: White.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
- F. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- G. Fasteners: Stainless-steel rivets or self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, and pipe size.
 - 1. Lettering Size: At least 1-1/2 inches (38 mm) high.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

- A. Piping Color-Coding: Painting of piping is specified in Division 09 Section "Interior Painting."
- B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.
 - 6. Spaced at maximum intervals of 20 feet along each run. Reduce intervals to 10 feet in areas of congested piping and equipment.
- C. Pipe Label Color Schedule:
 - 1. Refrigerant Piping:
 - a. Background Color: Yellow.
 - b. Letter Color: Black.

END OF SECTION

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SECTION 23 05 93 – TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Balancing Air Systems:
 - a. Variable-air-volume air systems.
 - b. Constant-volume systems.
 - 2. Building Flush-Out Requirements

1.2 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An entity engaged to perform TAB Work.

1.3 SUBMITTALS

- A. Certified TAB reports.

1.4 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC NEBB or TABB with a minimum of 15 years of successful testing, adjusting, and balancing experience.
 - 1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC NEBB or TABB.
 - 2. TAB Technician: Employee of the TAB contractor and who is certified by AABC NEBB or TABB as a TAB technician.
- B. Certify TAB field data reports and perform the following:
 - 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 - 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

- C. TAB Report Forms: Use standard TAB contractor's forms approved by Architect.
- D. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

1.5 PROJECT CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.6 COORDINATION

- A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.
- B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

- E. Examine equipment performance data including fan and pump curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- G. Examine test reports specified in individual system and equipment Sections.
- H. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- I. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
- J. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- K. Examine operating safety interlocks and controls on HVAC equipment.
- L. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.

- B. Complete system-readiness checks and prepare reports. Verify the following:
 - 1. Permanent electrical-power wiring is complete.
 - 2. Automatic temperature-control systems are operational.
 - 3. Equipment and duct access doors are securely closed.
 - 4. Balance, smoke, and fire dampers are open.
 - 5. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
 - 6. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in ASHRAE 111 and in this Section.
 - 1. Comply with requirements in ASHRAE 62.1-2004, Section 7.2.2, "Air Balancing."
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 - 2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Division 23 Section "HVAC Insulation."
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- D. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.

- G. Check dampers for proper position to achieve desired airflow path.
- H. Check for airflow blockages.
- I. Check condensate drains for proper connections and functioning.
- J. Check for proper sealing of air-handling-unit components.
- K. Verify that air duct system is sealed as specified in Division 23 Section "Metal Ducts."

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow.
 - a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
 - 2. Measure fan static pressures as follows to determine actual static pressure:
 - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
 - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 - 3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
 - a. Report the cleanliness status of filters and the time static pressures are measured.
 - 4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
 - 5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.

6. Obtain approval from Architect for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in Division 23 Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
1. Measure airflow of submain and branch ducts.
 - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
 3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure air outlets and inlets without making adjustments.
1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
1. Manufacturer's name, model number, and serial number.
 2. Motor horsepower rating.
 3. Motor rpm.
 4. Efficiency rating.
 5. Nameplate and measured voltage, each phase.
 6. Nameplate and measured amperage, each phase.
 7. Starter thermal-protection-element rating.

- B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.7 PROCEDURES FOR CONDENSING UNITS

- A. Verify proper rotation of fans.
- B. Measure entering- and leaving-air temperatures.
- C. Record compressor data.

3.8 PROCEDURES FOR HEAT-TRANSFER COILS

- A. Measure, adjust, and record the following data for each refrigerant coil:
 1. Dry-bulb temperature of entering and leaving air.
 2. Wet-bulb temperature of entering and leaving air.
 3. Airflow.
 4. Air pressure drop.
 5. Refrigerant suction pressure and temperature.

3.9 PROCEDURES FOR BUILDING FLUSH-OUT

- A. Refer to Section 230500 Common Work Results for HVAC for building flush-out requirements.
- B. Building flush-out must be complete after completion of Test and Balance procedures.

3.10 TOLERANCES

- A. Set HVAC system's air flow rates within the following tolerances:
 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
 2. Air Outlets and Inlets: Plus or minus 10 percent.
 3. Outside Air Rates: Plus or minus 10 percent.

3.11 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

3.12 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 2. Include a list of instruments used for procedures, along with proof of calibration.
- B. Final Report Contents: In addition to certified field-report data, include the following:
1. Fan curves.
 2. Manufacturers' test data.
 3. Field test reports prepared by system and equipment installers.
 4. Other information relative to equipment performance; do not include Shop Drawings and product data.
- C. General Report Data: In addition to form titles and entries, include the following data:
1. Title page.
 2. Name and address of the TAB contractor.
 3. Project name.
 4. Project location.
 5. Architect's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of TAB supervisor who certifies the report.
 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 12. Nomenclature sheets for each item of equipment.
 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
 14. Notes to explain why certain final data in the body of reports vary from indicated values.
 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.

- D. System Diagrams: Include schematic layouts of air distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
 2. Duct, outlet, and inlet sizes.
 3. Terminal units.
 4. Balancing stations.
 5. Position of balancing devices.

END OF SECTION

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SECTION 23 07 00 – HVAC INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Insulation Materials:
 - a. Flexible elastomeric.
 - b. Mineral fiber.
2. Fire-rated insulation systems.
3. Adhesives.
4. Mastics.
5. Sealants.
6. Factory-applied jackets.
7. Field-applied jackets.
8. Tapes.
9. Securements.
10. Corner angles.

B. Related Sections:

1. Division 22 Section "Plumbing."
2. Division 23 Section "Metal Ducts" for duct liners.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Aeroflex USA Inc.; Aerocel.
 - b. Armacell LLC; AP Armaflex.
 - c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.
- G. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed Corp.; Duct Wrap.
 - b. Johns Manville; Microlite.
 - c. Knauf Insulation; Duct Wrap.
 - d. Owens Corning; All-Service Duct Wrap.

2.2 FIRE-RATED INSULATION SYSTEMS

- A. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a 2-hour fire rating by a NRTL acceptable to authority having jurisdiction.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed Corp.; FlameChek.
 - b. Johns Manville; Firetemp Wrap.
 - c. Thermal Ceramics; FireMaster Duct Wrap.
 - d. 3M; Fire Barrier Wrap Products.

2.3 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B. Flexible Elastomeric Adhesive: Comply with MIL-A-24179A, Type II, Class I.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Aeroflex USA Inc.; Aero seal.
 - b. Armacell LCC; 520 Adhesive.
 - c. Foster Products Corporation, H. B. Fuller Company; 85-75.
 - d. RBX Corporation; Rubatex Contact Adhesive.
 - 2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 - 1. Products: Subject to compliance with requirements, provide one of the following
 - a. Childers Products, Division of ITW; CP-82.
 - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
 - c. ITW TACC, Division of Illinois Tool Works; S-90/80.
 - d. Marathon Industries, Inc.; 225.
 - e. Mon-Eco Industries, Inc.; 22-25.
 - 2. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. ASJ Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-82.
 - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
 - c. ITW TACC, Division of Illinois Tool Works; S-90/80.
 - d. Marathon Industries, Inc.; 225.
 - e. Mon-Eco Industries, Inc.; 22-25.
 - 2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. PVC Jacket Adhesive: Compatible with PVC jacket.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Chemical Company (The); 739, Dow Silicone.
 - b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
 - c. P.I.C. Plastics, Inc.; Welding Adhesive.

- d. Speedline Corporation; Speedline Vinyl Adhesive.
2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.
 1. For indoor applications, use mastics that have a VOC content of 500 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-35.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-90.
 - c. ITW TACC, Division of Illinois Tool Works; CB-50.
 - d. Marathon Industries, Inc.; 590.
 - e. Mon-Eco Industries, Inc.; 55-40.
 - f. Vimasco Corporation; 749.
 2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm (0.009 metric perm) at 43-mil (1.09-mm) dry film thickness.
 3. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
 4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
 5. Color: White.
- C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-10.
 - b. Foster Products Corporation, H. B. Fuller Company; 35-00.
 - c. ITW TACC, Division of Illinois Tool Works; CB-05/15.
 - d. Marathon Industries, Inc.; 550.
 - e. Mon-Eco Industries, Inc.; 55-50.
 - f. Vimasco Corporation; WC-1/WC-5.
 2. Water-Vapor Permeance: ASTM F 1249, 3 perms (2 metric perms) at 0.0625-inch (1.6-mm) dry film thickness.
 3. Service Temperature Range: Minus 20 to plus 200 deg F (Minus 29 to plus 93 deg C).
 4. Solids Content: 63 percent by volume and 73 percent by weight.
 5. Color: White.

2.5 SEALANTS

A. Joint Sealants:

1. Joint Sealants for Cellular-Glass Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-76.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-45.
 - c. Marathon Industries, Inc.; 405.
 - d. Mon-Eco Industries, Inc.; 44-05.
 - e. Pittsburgh Corning Corporation; Pittseal 444.

B. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-76-8.
 - b. Foster Products Corporation, H. B. Fuller Company; 95-44.
 - c. Marathon Industries, Inc.; 405.
 - d. Mon-Eco Industries, Inc.; 44-05.
 - e. Vimasco Corporation; 750.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
5. Color: Aluminum.
6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. ASJ Flashing Sealants and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-76.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
5. Color: White.
6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.6 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.7 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Johns Manville; Zeston.
 - b. P.I.C. Plastics, Inc.; FG Series.
 - c. Proto PVC Corporation; LoSmoke.
 - d. Speedline Corporation; SmokeSafe.
 2. Adhesive: As recommended by jacket material manufacturer.
 3. Color: White.
 4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.
 5. Factory-fabricated tank heads and tank side panels.
- C. Aluminum Jacket: Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105 or 5005, Temper H-14.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; Metal Jacketing Systems.
 - b. PABCO Metals Corporation; Surefit.
 - c. RPR Products, Inc.; Insul-Mate.
 2. Sheet and roll stock ready for shop or field sizing.
 3. Finish and thickness are indicated in field-applied jacket schedules.
 4. Moisture Barrier for Indoor Applications: 1-mil- (0.025-mm-) thick, heat-bonded polyethylene and kraft paper.
 5. Moisture Barrier for Outdoor Applications: 3-mil- (0.075-mm-) thick, heat-bonded polyethylene and kraft paper.
 6. Factory-Fabricated Fitting Covers:
 - a. Same material, finish, and thickness as jacket.
 - b. Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - c. Tee covers.

- d. Flange and union covers.
- e. End caps.
- f. Beveled collars.
- g. Valve covers.
- h. Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

2.8 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
 - b. Compac Corp.; 104 and 105.
 - c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
 - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
 2. Width: 3 inches (75 mm).
 3. Thickness: 11.5 mils (0.29 mm).
 4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
 - b. Compac Corp.; 110 and 111.
 - c. Ideal Tape Co., Inc., an American Biltrite Company; 491 AWF FSK.
 - d. Venture Tape; 1525 CW, 1528 CW, and 1528 CW/SQ.
 2. Width: 3 inches (75 mm).
 3. Thickness: 6.5 mils (0.16 mm).
 4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
 7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
- C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0555.
 - b. Compac Corp.; 130.

- c. Ideal Tape Co., Inc., an American Biltrite Company; 370 White PVC tape.
 - d. Venture Tape; 1506 CW NS.
2. Width: 2 inches (50 mm).
 3. Thickness: 6 mils (0.15 mm).
 4. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
 5. Elongation: 500 percent.
 6. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.
- D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
 - b. Compac Corp.; 120.
 - c. Ideal Tape Co., Inc., an American Biltrite Company; 488 AWF.
 - d. Venture Tape; 3520 CW.
 2. Width: 2 inches (50 mm).
 3. Thickness: 3.7 mils (0.093 mm).
 4. Adhesion: 100 ounces force/inch (1.1 N/mm) in width.
 5. Elongation: 5 percent.
 6. Tensile Strength: 34 lbf/inch (6.2 N/mm) in width.

2.9 SECUREMENTS

A. Insulation Pins and Hangers:

1. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) AGM Industries, Inc.; Tactoo Insul-Hangers, Series T.
 - 2) GEMCO; Perforated Base.
 - 3) Midwest Fasteners, Inc.; Spindle.
 - b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch (0.76 mm) thick by 2 inches (50 mm) square.
 - c. Spindle: Copper- or zinc-coated, low carbon steel, fully annealed, 0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insulation indicated.
 - d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.

- a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) AGM Industries, Inc.; RC-150.
 - 2) GEMCO; R-150.
 - 3) Midwest Fasteners, Inc.; WA-150.
 - 4) Nelson Stud Welding; Speed Clips.
 - b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.
3. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.
- a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) GEMCO.
 - 2) Midwest Fasteners, Inc.
- B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- (19-mm-) wide, stainless steel or Monel.
- C. Wire: 0.062-inch (1.6-mm) soft-annealed, galvanized steel.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. C & F Wire.
 - b. Childers Products.
 - c. PABCO Metals Corporation.
 - d. RPR Products, Inc.

2.10 CORNER ANGLES

- A. PVC Corner Angles: 30 mils (0.8 mm) thick, minimum 1 by 1 inch (25 by 25 mm), PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.
- B. Aluminum Corner Angles: 0.040 inch (1.0 mm) thick, minimum 1 by 1 inch (25 by 25 mm), aluminum according to ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105 or 5005; Temper H-14.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
 2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
 3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches (100 mm) o.c.
 - a. For below ambient services, apply vapor-barrier mastic over staples.
 4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above ambient services, do not install insulation to the following:
1. Vibration-control devices.
 2. Testing agency labels and stamps.
 3. Nameplates and data plates.
 4. Manholes.
 5. Handholes.
 6. Cleanouts.

3.3 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
1. Seal penetrations with flashing sealant.
 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).
 4. Seal jacket to wall flashing with flashing sealant.
- C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches (50 mm).
1. Comply with requirements in Division 07 Section "Penetration Firestopping" firestopping and fire-resistive joint sealers.
- E. Insulation Installation at Floor Penetrations:
1. Duct: Install insulation continuously through floor penetrations that are not fire rated. For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches (50 mm).
 2. Pipe: Install insulation continuously through floor penetrations.
 3. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.4 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe

- insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
 3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
 4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches (50 mm) over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.5 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- B. Insulation Installation on Pipe Flanges:
 1. Install pipe insulation to outer diameter of pipe flange.
 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
 4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- C. Insulation Installation on Pipe Fittings and Elbows:
 1. Install mitered sections of pipe insulation.
 2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- D. Insulation Installation on Valves and Pipe Specialties:
 1. Install preformed valve covers manufactured of same material as pipe insulation when available.
 2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 3. Install insulation to flanges as specified for flange insulation application.
 4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.6 MINERAL-FIBER INSULATION INSTALLATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
 1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

- a. On duct sides with dimensions 18 inches (450 mm) and smaller, place pins along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.
 - b. On duct sides with dimensions larger than 18 inches (450 mm), place pins 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Impale insulation over pins and attach speed washers.
 - f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch (13-mm) outward-clinching staples, 1 inch (25 mm) o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F (10 deg C) at 18-foot (5.5-m) intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches (75 mm).
 5. Overlap unfaced blankets a minimum of 2 inches (50 mm) on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches (450 mm) o.c.
 6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
 7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- (150-mm-) wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c.
- B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

- a. On duct sides with dimensions 18 inches (450 mm) and smaller, place pins along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.
 - b. On duct sides with dimensions larger than 18 inches (450 mm), space pins 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch (13-mm) outward-clinching staples, 1 inch (25 mm) o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F (10 deg C) at 18-foot (5.5-m) intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches (75 mm).
 5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
 6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- (150-mm-) wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c.

3.7 FIELD-APPLIED JACKET INSTALLATION

- A. Where PVC jackets are indicated, install with 1-inch (25-mm) overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.
 1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.
- B. Where metal jackets are indicated, install with 2-inch (50-mm) overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches (300 mm) o.c. and at end joints.

3.8 FIRE-RATED INSULATION SYSTEM INSTALLATION

- A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.
- B. Insulate duct access panels and doors to achieve same fire rating as duct.
- C. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Division 07 Section "Penetration Firestopping."

3.9 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

- 1. Indoor, concealed supply and outdoor air.
- 2. Indoor, concealed return located in nonconditioned space.
- 3. Indoor, concealed, Type I, commercial, kitchen hood exhaust.
- 4. Indoor, exposed, Type I, commercial, kitchen hood exhaust.
- 5. Outdoor, concealed supply and return.
- 6. Outdoor, exposed supply and return.

B. Items Not Insulated:

- 1. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
- 2. Factory-insulated flexible ducts.
- 3. Factory-insulated plenums and casings.
- 4. Flexible connectors.
- 5. Vibration-control devices.
- 6. Factory-insulated access panels and doors.

3.10 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed, Supply-Air Duct and Plenum Insulation: Mineral-fiber blanket, 1-1/2 inches (38 mm) thick and 0.75-lb/cu. ft. (12-kg/cu. m) nominal density (R-4.2 minimum).
- B. Concealed, Return-Air Duct and Plenum Insulation: Mineral-fiber blanket, 1-1/2 inches (38 mm) thick and 0.75-lb/cu. ft. (12-kg/cu. m) nominal density (R-4.2 minimum).
- C. Concealed, Outdoor-Air Duct and Plenum Insulation: Mineral-fiber blanket, 1-1/2 inches (38 mm) thick and 0.75-lb/cu. ft. (12-kg/cu. m) nominal density (R-4.2 minimum).
- D. Exposed, Supply-Air Duct Insulation: Mineral-Fiber Board 1 inch thick and minimum 2-lb/cu. ft. nominal density.

3.11 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - 1. Drainage piping located in crawl spaces.
 - 2. Underground piping.
 - 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.12 INDOOR PIPING INSULATION SCHEDULE

- A. Refrigerant Suction and Hot-Gas Piping: Flexible elastomeric, 1 inch (25 mm) thick.

3.13 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

- A. Refrigerant Suction and Hot-Gas Piping: Insulation shall be one of the following:
 - 1. Flexible Elastomeric: 1-1/2 inches (38 mm) thick.

3.14 INDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Ducts and Plenums, Exposed:
 - 1. None.
- D. Piping, Exposed:
 - 1. PVC: 20 mils (0.5 mm) thick.

3.15 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Ducts and Plenums, Concealed:
 - 1. None.

D. Piping, Exposed:

1. Aluminum, corrugated: 0.024 inches thick.

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SECTION 23 08 00 – COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes commissioning process requirements for HVAC&R systems, assemblies, and equipment.
- B. Related Sections:
 - 1. Division 01 Section "General Commissioning Requirements" for general commissioning process requirements.

1.3 DEFINITIONS

- A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- B. CxA: Commissioning Authority.
- C. HVAC&R: Heating, Ventilating, Air Conditioning, and Refrigeration.
- D. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.4 ALLOWANCES

- A. Labor, instrumentation, tools, and equipment costs for technicians for the performance of commissioning testing shall be covered by the Commissioning Authority.

1.5 CONTRACTOR'S RESPONSIBILITIES

- A. Perform commissioning tests at the direction of the CxA.
- B. Attend construction phase controls coordination meeting.
- C. Attend testing, adjusting, and balancing review and coordination meeting.
- D. Participate in HVAC&R systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.

- E. Provide information requested by the CxA for final commissioning documentation.
- F. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

1.6 CxA'S RESPONSIBILITIES

- A. Provide Project-specific construction checklists and commissioning process test procedures for actual HVAC&R systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.
- B. Direct commissioning testing.
- C. Verify testing, adjusting, and balancing of Work are complete.
- D. Provide test data, inspection reports, and certificates in Systems Manual.

1.7 COMMISSIONING DOCUMENTATION

- A. Provide the following information to the CxA for inclusion in the commissioning plan:
 - 1. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
 - 2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
 - 3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for HVAC&R systems, assemblies, equipment, and components to be verified and tested.
 - 4. Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.
 - 5. Certificate of readiness certifying that HVAC&R systems, subsystems, equipment, and associated controls are ready for testing.
 - 6. Test and inspection reports and certificates.
 - 7. Corrective action documents.
 - 8. Verification of testing, adjusting, and balancing reports.

1.8 SUBMITTALS

- A. Certificates of readiness.
- B. Certificates of completion of installation, prestart, and startup activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TESTING PREPARATION

- A. Certify that HVAC&R systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.
- B. Certify that HVAC&R instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.
- C. Certify that testing, adjusting, and balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.
- D. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
- E. Inspect and verify the position of each device and interlock identified on checklists.
- F. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.
- G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.2 TESTING AND BALANCING VERIFICATION

- A. Prior to performance of testing and balancing Work, provide copies of reports, sample forms, checklists, and certificates to the CxA.
- B. Notify the CxA at least 10 days in advance of testing and balancing Work, and provide access for the CxA to witness testing and balancing Work.
- C. Provide technicians, instrumentation, and tools to verify testing and balancing of HVAC&R systems at the direction of the CxA.
 - 1. The CxA will notify testing and balancing Contractor 10 days in advance of the date of field verification. Notice will not include data points to be verified.
 - 2. The testing and balancing Contractor shall use the same instruments (by model and serial number) that were used when original data were collected.
 - 3. Failure of an item includes, other than sound, a deviation of more than 10 percent. Failure of more than 10 percent of selected items shall result in rejection of final testing, adjusting, and balancing report. For sound pressure readings, a deviation of 3 dB shall result in rejection of final testing. Variations in background noise must be considered.

4. Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

3.3 GENERAL TESTING REQUIREMENTS

- A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.
- B. Scope of HVAC&R testing shall include entire HVAC&R installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space. Testing shall include measuring capacities and effectiveness of operational and control functions.
- C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.
- D. The CxA along with the HVAC&R Contractor, testing and balancing Contractor and HVAC&R Instrumentation and Control Contractor shall prepare detailed testing plans, procedures, and checklists for HVAC&R systems, subsystems, and equipment.
- E. Tests will be performed using design conditions whenever possible.
- F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.
- G. The CxA may direct that set points be altered when simulating conditions is not practical.
- H. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.
- I. If tests cannot be completed because of a deficiency outside the scope of the HVAC&R system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.
- J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.4 HVAC&R SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

- A. HVAC&R Instrumentation and Control System Testing: Field testing plans and testing requirements are specified in Division 25 Sections "Instrumentation and Control for HVAC" and "Sequence of Operations for HVAC Controls." Assist the CxA with preparation of testing plans.

- B. Refrigeration System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of refrigerant compressors and condensers, heat pumps, and other refrigeration systems. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested.
- C. HVAC&R Distribution System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of air distribution systems; special exhaust; and other distribution systems, including HVAC&R terminal equipment and unitary equipment.

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SECTION 23 09 23 – BUILDING MANAGEMENT SYSTEM

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS:

- A. The General Mechanical Provisions of Section 23 00 00 shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE:

- A. General: The direct digital control and energy management system (DDC/EMS) includes control panels, control devices, valves, actuators, all line and low voltage control and interlock wiring (including wiring to controllers, switches, timers, relays, etc.) and conduit and related equipment, as required for proper operation of all equipment. Provide all equipment, programming, labor, materials and services necessary for a complete, lawful and operating DDC/EMS as shown or noted on the drawings and as specified herein. All control wiring, line and low voltage shall be installed in conduit. Power wiring, power to DDC/EMS control panels and disconnect switches are included in the Electrical Specifications, except that power wiring for control devices such as controllers, valves, etc., is included in the control system. Electrical work shall be in accordance with Electrical Specifications. The system shall be direct digital control/electric. **The control system shall be direct digital. Johnson Metasys, without substitution, to match existing campus standards. The system shall be Niagara 4 (or later to tie into and match existing campus version), HTML5 based, with open license supervisory controller.** The system shall communicate over the District's Ethernet LAN/WAN, and shall include the latest upgrading (software and firmware) during the warranty period. The data wiring shall have an Ethernet connection at the DDC/EMS panel. A Graphical User Interface (GUI) shall be provided. Coordinate with Section 23 00 01, Heating, Ventilating and Air Conditioning and with Division 26. Comply with ASHRAE 55 and Title 24.

1. All work described in this section shall be installed, wired, circuit tested and calibrated by factory certified technicians qualified for this work.
2. Coordinate and cooperate with commission agent as required by Section 01 91 13.

- B. Contractor Qualifications: All controls shall be furnished and installed by a Contractor who is licensed, certified and approved by the controls manufacturer for design, installation, start-up and service of their product. The Contractor must have sufficient personnel to respond to a trouble call at the site within four hours. The Contractor's local manager shall have a minimum of five years' experience in the design, installation, start-up and service of similar systems. The Contractor shall submit a list of at least five projects which are similar in size, scope and contract value to this project. This list shall include the Owner's contact person, phone number and controls contract value.

- C. Submittals: Within 60 days of contract award, submit eight (8) copies of shop drawings showing the following aspects of the DDC/EMS system (CAD file with DXF format if required of floor and site plans can be secured from the Architect).

1. All termination points, terminal cabinets, and cabling.
 2. Schedule of input and output points.
 3. Locations of all visible DDC/EMS system components (i.e. interior and exterior sensors, terminal strips, panels, trench and pull boxes, etc.), identifying specifically any exposed conduit.
 4. Descriptive literature for all material and equipment items shall include manufacturer's name and catalog numbers, dimensions, capacities, and all other characteristics and accessories as listed in the specifications or on the drawings.
 5. Submit copies of forms to be used for testing and verification showing all data which is to be recorded. Three copies of complete report shall be submitted for review.
 6. Complete written sequence of operation for all controlled equipment.
- D. Installation and Operation Manuals: Furnish Installation and Operating Manuals for all components. These manuals shall contain full documentation which shall include, without being limited to, the following:
1. General description and specifications.
 2. Installation and initial checkout procedures.
 3. Complete alignment and calibration procedures for all components.
 4. Detailed schematics and assembly drawings and communication trunk diagram with control unit addresses.
 5. BACNet architecture diagrams
 6. Sequence of Operations.
 7. Controller points lists.

1.3 SYSTEM ARCHITECTURE

- A. DDC/EMS Equipment: The main controller shall contain the network communications and information management programs providing integrated global control, trend logging, local and remote alarming and fully menu driven user interface. The local network controller must be an intelligent, stand-alone microprocessor based controller which can have a variety of configurations based on their application.
- B. Campus-Wide Data Transfer System: The DDC/EMS shop drawings shall indicate where all equipment items are to be located for input and output to complete the system. The conduit/cabling system shall inter-tie these points as required to complete one system to meet the design criteria herein. Conduit shall be used for all EMS wiring whenever access is limited (hard-lid, walls, etc). When EMS wiring is installed in/above accessible areas (such as T-bar ceilings), free-air with J-hooks and wire-ties is acceptable. However, EMS wiring cannot be intermixed or bundled with any other cabling/wiring (Fire Alarm, internet, etc). System high speed communication shall be hardwired using a Belden shielded cable as recommended by DDC manufacturer.
- C. User Interface Communication: The user may communicate with the DDC/EMS system with a workstation located at the District Office over the WAN, with a remote workstation, with an On-Campus Operator Workstation, or with a Lap-Top computer (Service Tool).
- D. Standard Network Support: All Master Controllers, Workstation(s) and File Server shall be capable of residing directly on the owner's Ethernet TCP/IP LAN/WAN. Furthermore,

the Master Controllers, Workstation(s) and File Server shall be capable of using standard, commercially available, off-the-shelf Ethernet infrastructure components such as routers, switches and hubs. With this design the owner may utilize the investment of an existing or new enterprise network or structured cabling system. This also allows the option of the maintenance of the LAN/WAN to be performed by the owner's Information Technology Department as all devices utilize standard TCP/IP components. If the DDC/EMS contractor needs an additional data port that is not already provided, its installation must be coordinated with the District's IT department (and IT infrastructure contractor if applicable) and shall be installed at the DDC/EMS contractor's expense. As a result, the DDC/EMS contractor shall ensure any additional data port locations are clearly indicated and that the existing EMS data ports they intend to utilize are addressed/identified prior to construction so they are not damaged or removed. This coordination shall occur between the District's Construction Office, IT department, DDC/EMS operator, IT infrastructure contractor (if applicable), and the project's general construction contractor manager.

PART 2 - PRODUCTS

2.1 GENERAL:

- A. General Requirements: The Electronic Microprocessor Based Direct Digital Control and Energy Management System (DDC/EMS) shall monitor the data environment and perform control functions in relation to a programmed strategy and the status of the data environment. The system shall use solid state computer based digital and analog technology. The system shall be standard with the manufacturer to insure on going parts availability and trained technical support. The DDC/EMS shall be of the user programmable type requiring no special computer education for operation. All necessary instruction manuals and user orientation training shall be supplied by the manufacturer or agent thereof. The DDC/EMS shall be UL listed as a Direct Digital Control and Energy Management System. The programmable control requirements of the DDC/EMS shall include, but not be limited to:

OPTIMUM START/STOP (BASED ON HISTORICAL DATA)
TIME OF DAY ROUTINES
SCHEDULED OCCUPANCY ROUTINES INCLUDING HOLIDAYS
CUSTOM TAILORED REPORTING
ACCUMULATING RUN TIME
CRITICAL CONDITION ALARMING
FLUID FLOW SWITCH AND CONTROL ALARMING
PID CONTROL ON ANALOG OUTPUTS
HOT WATER RESET
DAY/NIGHT SETBACK
ECONOMIZER/PURGE
CUSTOM TAILORED REPORTING
ACCUMULATING RUN TIME
POINT OVERRIDE ABILITY FOR EVERY DIGITAL AND ANALOG OUTPUT
SEPARATE MODES AS REQUIRED BY CONTROL SEQUENCE
ALL EXTERIOR LIGHTING CIRCUITS CONTROLLED BY SYSTEM

- B. Environment: The DDC/EMS shall operate in an environment of 40 120 degrees F and 10 95% relative humidity. Sensors and control elements shall operate under the temperature, pressure, humidity, and vibration conditions normally encountered in the installed location. The DDC/EMS shall maintain accuracy as follows:
1. +/- 0.5 F for the space temperatures in the 0 F 130 F range.
 2. +/- 0.5 F for duct temperatures in the 40 F 130 F range.
 3. +/- 1.0 F for outside air temperatures in the 30 230 F range.
 4. +/- 1.0 F for water temperature in the 30 230 F range.
 5. KWH and KW monitoring within 1.0%.
- C. Battery Backup: The system shall be tolerant of power failure and hold memory for a minimum of 12 hours. On power restoration, the system shall automatically and without operator intervention of execution of manual restart procedures:
1. Come On Line.
 2. Update all monitored functions.
 3. Resume operation based on current time and status.
 4. Implement special building start up strategies as required.
 5. Log time of power outages and start ups.
- D. Program Storage: All JACE 8000 hardware licenses and certificates shall be stored on local MicroSD memory card employing encrypted “safe boot” technology.
- E. Protocol: Protocol shall be BACNet. The Main Controller shall be enabled to support and shall be licensed with the following Open protocol drivers (client and server) by default.
1. BACNet
 2. Lon
 3. Modbus
 4. SNMP
 5. KNX
- F. The Main Controller shall provide the following hardware features as a minimum:
1. Two 10/100 Mbps Ethernet ports.
 2. Two Isolated RS-485 ports with biasing switches.
 3. 1 GB RAM
 4. 4 GB Flash Total Storage / 2 GB User Storage
 5. Wi-Fi (Client or WAP)
 6. USB Flash Drive
 7. High Speed Field Bus Expansion
 8. -20-60°C Ambient Operating Temperature
 9. Integrated 24 VAC/DC Global Power Supply
 10. MicroSD Memory Card Employing Encrypted Safe Boot Technology
- G. The Main Controller shall be provided with a 5 Year (SMA) Software Maintenance Agreement. Labor to implement not included.

2.2 SYSTEMS DESCRIPTION:

- A. Modular Design/Expandability: The DDC/EMS shall be of a modular design providing distributed processing capability, and allowing future expansion of both input/output

points and processing/control functions. The modular DDC/EMS shall be configured on the main/local concept. The main controller shall have the capability of adding local controllers and the local controllers shall be capable of adding I/O modules.

- B. Existing Main (Master) Description: The master functions as the overall system coordinator, accept control programs, perform automated energy management functions, control peripheral devices and perform all necessary mathematical calculations.
- C. Local Controller Units: The local units function as a stand-alone controller and as an Input/Output interface of the DDC/EMS and the Data Environment.
 - 1. HVAC units must be fully controlled by a controller connected to the DDC/EMS that can be fully programmed by the DDC/EMS contractor.
 - 2. Monitoring: Local units shall be used to connect the data environment to the system and contain all necessary Input/Output functions to read field sensors and operate controlled equipment based on internal instructions or instructions from the Master. The units shall be fully supervised to detect failures. The units shall report the status of all points in its data environment at the rate of at least once every second. Local units shall connect directly to the Master with a twisted pair shielded RS-485 interface.
 - 3. Unit Failure: Upon failure of the unit (including transmission failure), the unit shall automatically fail off or to a predetermined state for three-way valves. All local units must run independently in the event of a central unit failure (including transmission failure) in bypass mode via the thermostat.
 - 4. Power: The unit shall operate from 120 VAC, +/-20%, 60 Hz, 220 VAC, +/-20%, 50 Hz or 24 VAC +/- 20%, 50/60 Hz power. For voltages below the operating threshold the unit shall totally shutdown and de energize its outputs.
 - 5. LAN and/or Field Bus: Each unit shall communicate with any unit through the RS-485 interface LAN and/or field bus.
 - 6. Auxiliary Port: Each unit shall be equipped with an auxiliary port to allow local interrogation of input and output values, and keyboard override of outputs through laptop.

2.3 INPUT/OUTPUT CAPABILITY:

- A. Inputs: The DDC/EMS shall accept information in the form of a temperature, voltage, digital signal (on off) or pulse counter.
 - 1. Analog Inputs: The Analog Input (AI) function shall monitor each analog input, perform A/D conversion, and hold the digital value in a buffer for interrogation. The A/D conversion shall have a minimum resolution of 10 bits. Input ranges shall be within the range of 0-10 VDC.
 - 2. Digital Inputs: The Digital Input (DI) function shall accept dry contact closures and voltage level or resistance level (5VDC reference voltage) transitions. A voltage level below 1 volt or a resistance below 500 ohms shall be read as ON (closed), a voltage level above 3 volts or a resistance above 1400 ohms shall be read as OFF (open).
 - 3. Pulse Accumulator Inputs: The pulse accumulator function shall have the same characteristics as the DI, except that, in addition, a buffer shall be included to totalize pulses between interrogations. Each input shall accept pulses at a minimum of 2 per second.
 - 4. Temperature Inputs: Temperature inputs originating from a thermistor, shall be monitored and buffered as an AI, except that, automatic conversion to degrees F shall occur without any additional signal conditioning.
 - 5. Input Wiring: All analog inputs shall be two wire devices, with shielded wire for accurate operation.

- B. Outputs:
1. Master and local controllers - Form C relay outputs rated at 5 amp, 24 VAC/DC or 2 amp, 30 VAC for on/off or Pulse Width Modulation for maintained operation of field devices. Output pulse width shall be selectable between 0.1 and 3200 seconds with a minimum resolution of 0.1 seconds. Isolation and protection against voltage surges shall be provided. Central plant controllers shall be equipped with an ON/OFF/AUTO switch to manually obtain either output state. Manual overrides shall be reported to the master at each update. An LED shall be provided to indicate the state of each digital output.
 2. All digital and analog output points on every controller must have an override (highest priority) input point in the controller's point list in the JACE. This override point must be clearly labeled and identifiable. For example, "DO1ovrd" would be the point to override Digital Output 1.

2.4 SOFTWARE:

- A. User Software: HTML5 based. Provide software (required upgrades) for Laptop Computer (Service Tool) and District office workstation, as required.
- B. Software Features:
1. Mathematical Requirements: The DDC/EMS shall have a math package capable of addition, subtraction, multiplication, division, square root, greater than and less than functions, minimum and maximum selection functions, and up to five levels of parenthesis for computation of variables. Control commands may be executed based on these calculated variables which are available to the program on a global basis. Math expressions may be used in action and exit commands of control program. The mathematical software shall be capable of mixed mode arithmetic, utilizing Boolean logic statements in combination with basic arithmetic to provide conditional mathematical computations.
 2. Passwords: The DDC/EMS shall have multiple levels of user programmable passwords in addition to a master password, for programming security. Separate passwords may be user programmed. Level of password will define user's access level and ability to change system.
 3. Trend Logging: The DDC/EMS shall trend log variables. Any system variable (inputs, outputs, numerals, can be trend logged.
 4. Messages: The DDC/EMS shall provide alarming, preventative maintenance and status reporting messages.
 5. Documentation Format: The programming language of the DDC/EMS shall be plain English based such that a printout of the control program shall serve as the primary documentation for the system.
 6. Micro Processor Integrity Checking: Each DDC/EMS microprocessor shall continuously monitor and check itself and produce error messages in the event of a malfunction.
 7. Data Plotting: The DDC/EMS shall provide plots of values of system variables on a graph. Graphs may consist of combinations of up to 3 system variables at a time from the history logs.
- C. Color Graphics Requirements Provide HTML5 based color graphics which allow user to access and change (based on user access level) all schedules and setpoints (including damper or control valve positions) directly through the user graphics. Real time data shall continuously be updated. Navigation between the screens (forward and backwards) shall be accomplished with the use of a mouse. The minimum graphic screens shall include the following:
1. Site lay-out locations of all equipment being controlled, control component locations, and spaces served. Provide multiple screens-minimum of 1 screen per

building plus site and others as needed for clarity. By "clicking" mouse on the desired equipment area a flow diagram will be displayed for the related equipment (as described below - Item 2). By "clicking" the mouse on a conditioned space, a graphic display of the zone conditions (as described below - Item 3) will be displayed.

2. Each building must have a graphical summary page of all the zones in that building that displays zone temperature, set point, discharge air temperature, and fan command.
 3. Zone & HVAC Equipment Description on GUI: Each item of HVAC equipment must be clearly identified by what area it serves and its unit number. For example, if HC-2A serves Classroom 4, the GUI should list it as "Classroom 4, HC-2A." It should NOT be listed as only "HC-2A" or "Classroom 4."
 4. Flow diagrams shall be provided for each HVAC system, such as air-handling system, chilled water system, hot water system, condenser water system, package unit system, brine system with all inputs and outputs dynamically displayed.
 5. Each temperature control zone shall have a screen providing set points, temperatures, and related HVAC system status data.
 6. Scheduling screens allowing On/Off times to be set.
- D. Software Manual: The software manual shall describe programming and testing, starting with a system overview and proceeding to a detailed description of each software feature. The manual shall instruct the user on programming or reprogramming any portion of the system. This shall include all control programs, variables, set points, time periods, messages, passwords and other information necessary to load, alter, test and execute the system. The manual shall include commands, editing and writing control programs, printouts and logs, mathematical calculations, and instructions on modifying any control point, verifying error status, changing passwords, and initiating or disabling control programs.
- E. Software Licenses: The owner shall be named the license holder of all software associated with any and all incremental work on the project(s). All Niagara 4 software licenses shall have the "accept.station.in=*"; "accept.station.out=*"; "accept.wb.in=*"; and "accept.we.out=*" section of the software licenses. The intent is to insure that the installed Niagara 4 products may be completely open for integrations. Owner shall be free to direct the modification of the software license, regardless of supplier. In addition, the Owner shall receive ownership of all job-specific software configuration documentation, data files, and application-level software developed for this project. This shall include all custom, job-specific software code and documentation for all configuration and programming that is generated for a given project and/or configured for use within Niagara Framework (Niagara 4) based controllers and/or servers and any related LAN/WAN/Intranet and Internet connected routers and devices. Any and all required IDs and passwords for access to any component or software program shall be provided to the Owner.

2.5 USER INTERFACE:

- A. LAN Connections: If an additional LAN connection is needed, the conduit and cable from LAN rack is to be installed by electrical contractor. The planned location of all LAN connections (new and existing) to EMS equipment must be coordinated with the District's networking staff and EMS staff as early as possible. Final connections shall be made by DDC/EMS Contractor.
- B. Direct Computer Communication: The DDC/EMS shall have a computer compatible communication mode for communication with other intelligent devices, which performs data integrity checking, with automatic retransmission of data when errors are detected.

- C. JACE software must include all applications to make all folders viewable and accessible in the JACE.

2.6 SYSTEM COMPONENTS:

A. Control Components:

1. Wall Switches: Plates for all wall switches and timers shall match those specified in Division 26.
2. Labels: All labels, signs, etc. shall be engraved, laminated plastic, white on black background, 1/8" high lettering, minimum.
3. Temperature Sensors:
 - a. Sensor Type: All temperature sensors shall be made of a highly stable, precision thermistor material accurate to within ± 0.36 Degrees F. Identify each temperature sensor with a "Lamicoid" label keyed to the control system as-built drawings.
 - b. Room Sensor: Room temperature sensor shall have Executive Decorator housing with programmable visible temperature indication. Housing shall include an occupancy override, temperature setpoint adjustment and a service tool jack.
 - c. Vandal Resistant Room Sensor: Where noted, shall be a blank stainless steel wall plate with the sensing element bonded to the back side. The plate back shall be insulated to reduce wall temperature influence.
 - d. Duct Sensor: Duct temperature sensor shall be a probe type element with 9 inch insertion length. Element shall be installed where air mixture provides a true temperature indication. Where adequate mixing is not practical, the duct temperature sensor shall have an averaging type thermistor element, installed across the entire cross section of the duct.
 - e. Outdoor Air Sensor: Outdoor air temperature sensor shall be a probe type element mounted in a ventilated, treated white PVC sun shield to minimize radiant energy effects. The sensor and sun shield shall be mounted on a weatherproof outlet box for outdoor installation.
 - f. Low Differential Air Pressure Applications (0" to 5" W.C.): The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points. Non-interactive zero and span adjustments, adjustable from the outside cover. (0.00 - 1.00" to 5.00") W.C. input differential pressure ranges. 4-20 mA output. Maintain accuracy up to 20 to 1 ratio turndown. Reference Accuracy: +0.2% of full span.
 - g. CO2 Sensor: The sensor shall have a five year recommended calibration interval. In addition, the sensor shall be provided with a five-year calibration guarantee, providing for free factory replacement if the sensor is found to be out of calibration within five years of the purchase date. The sensor shall have accuracy of ± 50 ppm and repeatability of ± 20 ppm. All adjustments to the sensor including output scaling, elevation adjustment, relay set point, relay dead-band, linear or exponential output, and single point calibration shall be made via on-board push buttons and LCD display. The LCD display must be covered by a solid door and only viewable when the door is opened for adjustments.
4. Temperature Control Panels: Each panel and each control device or readout on the front of the panel shall be identified with a laminated plastic label with 1/4" high engraved lettering, white on black background. Pilot lights shall be the push to test type.
5. Smoke Detectors: Furnished and installed by Division 26. Power and fire alarm wiring by Division 28. Control wiring by Division 23. Coordinate with Division

- 26.
6. Status Sensor: Current sensing status sensor (with sensitivity adjustment for belt loss detection).
- B. Conduit: Conduit to be a minimum 1" diameter, and to have at least 25% spare capacity, except drops to room sensors may be run in ½" conduit. Conduit shall be run in electrical or mechanical trenches wherever possible. Site conduit (building to building) will be installed (and terminated inside the building) by Division 26.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION:

- A. General: All electrical work shall be in accordance with the California Electrical Code and the Electrical Specification Sections. All electric/electronic systems shall be hardwired in conduit, except as specifically allowed by 1.3, B. Wiring shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed wiring shall run parallel to room surfaces; location shall be approved by the Architect. No structural member shall be weakened by cutting, notching, boring or otherwise. Provide a 120 volt circuit for each device requiring external power. Dedicated circuits shall be provided where required. Any devices or wiring exposed to the weather shall be protected in weatherproof enclosures such as NEMA 3R and weatherproof conduit.
- B. Labeling of System: DDC/EMS Contractor shall provide complete labeling of all terminals at all panels or equipment terminal strips and wiring. Equal to Brady marking on wires and number on terminals in sequence corresponding to control diagram.
- C. Programming:
1. The Direct Digital Control and Energy Management System (DDC/EMS) operational program shall be provided by the DDC/EMS Contractor. The DDC/EMS Contractor shall be responsible for programming the system and shall coordinate the scheduling (on/off times) with the Owner. Prior to start-up, the DDC/EMS Contractor shall provide any testing program he feels necessary to fully test the operation of the various components.
 2. The DDC/EMS Contractor shall load the operational program into the DDC/EMS controller from his office via the District's network (via VPN) or at the job site via a direct connect cable. Prior to starting up the system, the DDC/EMS Contractor shall:
 - a. Confirm that the control system has been connected to the District's LAN/WAN and that the LAN/Wan is working.
 - b. Confirm the functionality of the DDC/EMS controllers and all input points by reading the input values, and comparing them with a measured temperature, pressure, voltage, current, or resistance as appropriate. Calibrate all transducers as required.
 - c. Confirm the functionality of all digital output points by manual operational of the relay contacts. Use proper discretion in starting and stopping equipment.
 - d. Confirm the functionality of all analog output points by manually imposing an adjustable voltage on the appropriate circuit to check proper operation of the controlled device. Calibrate all transducers as required.
 - e. The DDC/EMS Contractor shall notify the General Contractor (one week in advance of) when the system will be ready for loading and testing the operational program. The DDC/EMS Contractor's start-up technician shall be present while the program is being loaded and shall communicate with the programmer prior and after program loading to

confirm proper operation.

- D. Training: Prior to final acceptance, the DDC/EMS Contractor shall provide operational training to the Owner's personnel. The training sessions shall include a complete demonstration of the system. Dates and times of the training sessions shall be coordinated through the Owner not less than one week prior to session. A total of 40 hours of instruction shall be provided. The DDC/EMS Contractor shall maintain a log of training sessions including dates, times and names/titles of those attending. The DDC/EMS Contractor shall submit a copy of this log on request. Contractor shall provide 1 week factory certified training schedule and class at owners' discretion.
- E. Testing and Acceptance: The DDC/EMS Contractor shall furnish a complete and operating system. The DDC/EMS Contractor shall also verify, in the presence of the Owner, the system accuracy and proper function of each controlled device and sensor. The following items shall be successfully demonstrated prior to acceptance by the Owner:
1. All system outputs including controllers, relays, and other control devices shall be addressed and start/stop functions demonstrated.
 2. All inputs shall be displayed and all event-initiated functions shall be demonstrated.
 3. Demonstrate program integrity and power restore sequence during and after a power failure and restoration.
 4. Deliver all Record Drawings, wiring diagrams, equipment specifications, installation and Operation Manuals and other documentation as required to describe the system.
 5. Complete operator training in the use, programming, and operation of the system.
- F. Start-up of the System:
1. The start-up period starts when the following conditions are met:
 - a. The DDC/EMS system and all involved HVAC equipment have been installed, connected to the DDC/EMS system and are ready to operate.
 - b. A start-up meeting has been conducted with representative of the General Contractor, Architect/Engineer, maintenance staff, and the DDC/EMS Contractor.
 - c. Consensus is reached, by the representatives at the above referenced meeting that it is appropriate for the start-up process to start.
 2. The alarm pagers called by the control system during the start-up period shall be the pagers carried by the Mechanical Contractor and/or DDC/EMS Contractor as appropriate. The Mechanical Contractor and DDC/EMS Contractor shall respond to all pages from the control system and work cooperatively to insure that the building environmental standards are maintained.
 3. The start-up process shall be completed and the warranty period shall start when the following conditions are met.
 - a. All training to be provided as part of the project has been completed.
 - b. No "alarm" or "condition reports" are being generated by the DDC/EMS system for seven (7) calendar days (168 hours) due to incomplete or inaccurate installation or programming.
 - c. All adjustments and "fine tuning" of the system have been completed.
- G. Verification: A written testing and start-up report must be submitted for approval before acceptance. In addition to the DDC/EMS Contractor's testing and start-up report, the Owner may independently verify the test results. The report on test results shall include setpoints and operating ranges of all components.

3.2 SEQUENCE OF OPERATION: The below sequences of operation are to be used as a primary guideline for DDC/EMS control logic sequence development. Any/all variations from the below

operation sequences must be approved by the District's DDC/EMS operator prior to implementation. All fans providing ventilation to meet minimum outside air requirements shall run continuously during occupied hours. Airside equipment (air handlers, etc.) shall start by normally open relay and signal from DDC/EMS.

- A. Provide graphics meeting District standards using the existing control sequences.
- B. System Operation Schedule: The equipment shall operate at the schedule set by the District.
- C. Split-System Heat Pump (IDU/ODU): Shall be activated by BAS. Unit shall be controlled by integral controls. Provide temperature sensor for the area being controlled and status sensors for indoor and outdoor units.
- D. Exhaust Fans: Exhaust fans serving restroom and snack bar (EF-1, EF-2) shall operate continuously during occupied hours. Exhaust fans serving hazardous areas (EF-3, EF-4, EF-5) shall have continuous operation.
- E. Fly Fan: Shall start/stop by wall switch at window. Current sensor shall report Fly Fan status to BAS.
- F. Domestic Hot Water Circulating Pump: Shall start/stop by BAS signal. Current sensor shall report pump status to BAS.
- G. Fire/Smoke Damper: Close the fire/smoke damper on alarm and shut down the air moving equipment serving the damper and signal fire alarm system.
- H. Lighting: BAS shall energize exterior lighting. Provide relay with an override switch.
- I. Provide monitoring points for the following plumbing equipment:
 - WH-1 Water Heater: Run Time, Alarm
 - P-1 Domestic Water Booster Pump: Alarm

END OF SECTION

SECTION 23 23 00 – REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes refrigerant piping used for air-conditioning applications.

1.2 PERFORMANCE REQUIREMENTS

- A. Line Test Pressure for Refrigerant R-410A:
 - 1. Suction Lines for Air-Conditioning Applications: 185 psig (1276 kPa).
 - 2. Suction Lines for Heat-Pump Applications: 325 psig (2241 kPa).
 - 3. Hot-Gas and Liquid Lines: 325 psig (2241 kPa).

1.3 SUBMITTALS

- A. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop based on manufacturer's test data.
 - 1. Refrigerant piping indicated on Drawings is schematic only. Size piping and design actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.

1.4 QUALITY ASSURANCE

- A. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."
- B. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.5 PRODUCT STORAGE AND HANDLING

- A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

- A. Copper Tube: ASTM B 88, Type K or L (ASTM B 88M, Type A or B).

- B. Wrought-Copper Fittings: ASME B16.22.
- C. Wrought-Copper Unions: ASME B16.22.
- D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.
- E. Brazing Filler Metals: AWS A5.8.
- F. Flexible Connectors:
 - 1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
 - 2. End Connections: Socket ends.
 - 3. Offset Performance: Capable of minimum 3/4-inch (20-mm) misalignment in minimum 7-inch- (180-mm-) long assembly.
 - 4. Pressure Rating: Factory test at minimum 500 psig (3450 kPa).
 - 5. Maximum Operating Temperature: 250 deg F (121 deg C).

2.2 VALVES AND SPECIALTIES

- A. Diaphragm Packless Valves:
 - 1. Body and Bonnet: Forged brass or cast bronze; globe design with straight-through or angle pattern.
 - 2. Diaphragm: Phosphor bronze and stainless steel with stainless-steel spring.
 - 3. Operator: Rising stem and hand wheel.
 - 4. Seat: Nylon.
 - 5. End Connections: Socket, union, or flanged.
 - 6. Working Pressure Rating: 500 psig (3450 kPa).
 - 7. Maximum Operating Temperature: 275 deg F (135 deg C).
- B. Service Valves:
 - 1. Body: Forged brass with brass cap including key end to remove core.
 - 2. Core: Removable ball-type check valve with stainless-steel spring.
 - 3. Seat: Polytetrafluoroethylene.
 - 4. End Connections: Copper spring.
 - 5. Working Pressure Rating: 500 psig (3450 kPa).
- C. Safety Relief Valves: Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.
 - 1. Body and Bonnet: Ductile iron and steel, with neoprene O-ring seal.
 - 2. Piston, Closing Spring, and Seat Insert: Stainless steel.
 - 3. Seat Disc: Polytetrafluoroethylene.
 - 4. End Connections: Threaded.
 - 5. Working Pressure Rating: 400 psig (2760 kPa).
 - 6. Maximum Operating Temperature: 240 deg F (116 deg C).

- D. Thermostatic Expansion Valves: Comply with ARI 750.
1. Body, Bonnet, and Seal Cap: Forged brass or steel.
 2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
 3. Packing and Gaskets: Non-asbestos.
 4. Capillary and Bulb: Copper tubing filled with refrigerant charge.
 5. Suction Temperature: 40 deg F (4.4 deg C).
 6. Superheat: Nonadjustable.
 7. Reverse-flow option (for heat-pump applications).
 8. End Connections: Socket, flare, or threaded union.
 9. Working Pressure Rating: 450 psig (3100 kPa).
- E. Straight-Type Strainers:
1. Body: Welded steel with corrosion-resistant coating.
 2. Screen: 100-mesh stainless steel.
 3. End Connections: Socket or flare.
 4. Working Pressure Rating: 500 psig (3450 kPa).
 5. Maximum Operating Temperature: 275 deg F (135 deg C).
- F. Angle-Type Strainers:
1. Body: Forged brass or cast bronze.
 2. Drain Plug: Brass hex plug.
 3. Screen: 100-mesh monel.
 4. End Connections: Socket or flare.
 5. Working Pressure Rating: 500 psig (3450 kPa).
 6. Maximum Operating Temperature: 275 deg F (135 deg C).
- G. Moisture/Liquid Indicators:
1. Body: Forged brass.
 2. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
 3. Indicator: Color coded to show moisture content in ppm.
 4. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
 5. End Connections: Socket or flare.
 6. Working Pressure Rating: 500 psig (3450 kPa).
 7. Maximum Operating Temperature: 240 deg F (116 deg C).
- H. Replaceable-Core Filter Dryers: Comply with ARI 730.
1. Body and Cover: Painted-steel shell with ductile-iron cover, stainless-steel screws, and neoprene gaskets.
 2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
 3. Desiccant Media: Activated alumina.
 4. Designed for reverse flow (for heat-pump applications).
 5. End Connections: Socket.
 6. Access Ports: NPS 1/4 (DN 8) connections at entering and leaving sides for pressure differential measurement.
 7. Maximum Pressure Loss: 2 psig (14 kPa).

8. Working Pressure Rating: 500 psig (3450 kPa).
9. Maximum Operating Temperature: 240 deg F (116 deg C).

2.3 REFRIGERANTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Atofina Chemicals, Inc.
 2. DuPont Company; Fluorochemicals Div.
 3. Honeywell, Inc.; Genetron Refrigerants.
 4. INEOS Fluor Americas LLC.
- B. ASHRAE 34, R-410A: Difluoromethane and Pentafluoroethane.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Suction Lines NPS 1-1/2 (DN 40) and Smaller for Conventional Air-Conditioning Applications: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed or soldered joints.
- B. Suction Lines NPS 2 to NPS 4 (DN 50 to DN 100) for Conventional Air-Conditioning Applications: Copper, Type ACR, drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
- C. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed or soldered joints.
- D. Safety-Relief-Valve Discharge Piping: Copper, Type ACR, drawn-temper tubing and wrought-copper fittings with soldered joints.

3.2 VALVE AND SPECIALTY APPLICATIONS

- A. Install diaphragm packless valves in suction and discharge lines of compressor.
- B. Install service valves for gage taps at strainers if they are not an integral part of strainers.
- C. Except as otherwise indicated, install diaphragm packless valves on inlet and outlet side of filter dryers.
- D. Install a full-sized, three-valve bypass around filter dryers.
- E. Install thermostatic expansion valves as close as possible to distributors on evaporators.
 1. Install valve so diaphragm case is warmer than bulb.

2. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.
 3. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.
- F. Install safety relief valves where required by ASME Boiler and Pressure Vessel Code. Pipe safety-relief-valve discharge line to outside according to ASHRAE 15.
- G. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.
- H. Install strainers upstream from and adjacent to the following unless they are furnished as an integral assembly for device being protected:
1. Solenoid valves.
 2. Thermostatic expansion valves.
 3. Compressor.
- I. Install filter dryers in liquid line between compressor and thermostatic expansion valve, and in the suction line at the compressor.
- J. Install flexible connectors at compressors.

3.3 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.
- B. Install refrigerant piping according to ASHRAE 15.
- C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping adjacent to machines to allow service and maintenance.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Select system components with pressure rating equal to or greater than system operating pressure.

- J. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
- K. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Division 08 Section "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.
- L. Install piping per equipment manufacturers requirements and guidelines for slope, distance, changes in direction, changes in elevation and branching.
- M. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.
- N. Slope refrigerant piping as follows:
 - 1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
 - 2. Install horizontal suction lines with a uniform slope downward to compressor.
 - 3. Install traps and double risers to entrain oil in vertical runs.
 - 4. Liquid lines may be installed level.
- O. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.
- P. Install pipe sleeves at penetrations in exterior walls and floor assemblies.
- Q. Seal penetrations through fire and smoke barriers according to Division 07 Section "Penetration Firestopping."
- R. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.
- S. Install sleeves through floors, walls, or ceilings, sized to permit installation of full-thickness insulation.
- T. Seal pipe penetrations through exterior walls according to Division 07 Section "Joint Sealants" for materials and methods.
- U. Identify refrigerant piping and valves according to Division 23 Section "Identification for HVAC Piping and Equipment."

3.4 PIPE JOINT CONSTRUCTION

- A. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."
- B. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
2. Use Type BA_g, cadmium-free silver alloy for joining copper with bronze or steel.

3.5 HANGERS AND SUPPORTS

- A. Hanger, support, and anchor products are specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."
- B. Install the following pipe attachments:
 1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet (6 m) long.
 2. Roller hangers and spring hangers for individual horizontal runs 20 feet (6 m) or longer.
 3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet (6 m) or longer, supported on a trapeze.
 4. Spring hangers to support vertical runs.
 5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
- C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:
 1. NPS 1/2 (DN 15): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).
 2. NPS 5/8 (DN 18): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).
 3. NPS 1 (DN 25): Maximum span, 72 inches (1800 mm); minimum rod size, 1/4 inch (6.4 mm).
 4. NPS 1-1/4 (DN 32): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
 5. NPS 1-1/2 (DN 40): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
 6. NPS 2 (DN 50): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
 7. NPS 2-1/2 (DN 65): Maximum span, 108 inches (2700 mm); minimum rod size, 3/8 inch (9.5 mm).
 8. All sizes, provide supports within 12 inches of all changes in direction.
- D. Support multifloor vertical runs at least at each floor.

3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 1. Comply with ASME B31.5, Chapter VI.
 2. Test refrigerant piping and specialties. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.

3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.
 - a. Fill system with nitrogen to the required test pressure.
 - b. System shall maintain test pressure at the manifold gage throughout duration of test.
 - c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
 - d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.7 SYSTEM CHARGING

- A. Charge system using the following procedures and per equipment manufacturers instructions:
 1. Install core in filter dryers after leak test but before evacuation.
 2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers (67 Pa). If vacuum holds for 12 hours, system is ready for charging.
 3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig (14 kPa).
 4. Charge system with a new filter-dryer core in charging line.

3.8 ADJUSTING

- A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.
- B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.
- C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.
- D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:
 1. Verify that compressor oil level is correct.
 2. Open compressor suction and discharge valves.
 3. Open refrigerant valves except bypass valves that are used for other purposes.
 4. Check open compressor-motor alignment and verify lubrication for motors and bearings.
- E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION

SECTION 23 31 13 – METAL DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rectangular ducts and fittings.
2. Round ducts and fittings.
3. Sheet metal materials.
4. Duct liner.
5. Sealants and gaskets.
6. Hangers and supports.
7. Seismic-restraint devices.

B. Related Sections:

1. Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Division 23 Section "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. Structural Performance: Duct hangers and supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7.
- C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

1.3 SUBMITTALS

A. Delegated-Design Submittal:

1. Sheet metal thicknesses.
2. Joint and seam construction and sealing.
3. Reinforcement details and spacing.
4. Materials, fabrication, assembly, and spacing of hangers and supports.

B. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

- A. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."
- B. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-4, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." Provide Drive Slip or Hemmed "S" Slip or approved equal.
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-5, "Longitudinal Seams - Rectangular Ducts," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." Provide Drive Slip or Hemmed "S" Slip or approved equal.
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 2, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 ROUND DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. McGill AirFlow LLC.
 - b. SEMCO Incorporated.
 - c. Sheet Metal Connectors, Inc.
 - d. Spiral Manufacturing Co., Inc.

- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Transverse Joints - Round Duct," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 1. Transverse Joints in Ducts Larger Than 60 Inches (1524 mm) in Diameter: Flanged.
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Seams - Round Duct and Fittings," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 1. Fabricate round ducts larger Than 90 inches (2286 mm) in diameter with butt-welded longitudinal seams.
- D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G60 (Z180).
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in the "Duct Schedule" Article.
- D. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
 - 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- E. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.4 DUCT LINER

- A. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 2. Maximum Thermal Conductivity:
 - a. Type II, Rigid: 0.23 Btu x in./h x sq. ft. x deg F (0.033 W/m x K) at 75 deg F (24 deg C) mean temperature.
 3. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
 4. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
 - a. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Insulation Pins and Washers:
1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch (38-mm) galvanized carbon-steel washer.
 2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick galvanized steel; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.

2.5 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Water-Based Joint and Seam Sealant:
1. Application Method: Brush on.
 2. Solids Content: Minimum 65 percent.
 3. Shore A Hardness: Minimum 20.
 4. Water resistant.
 5. Mold and mildew resistant.
 6. VOC: Maximum 75 g/L (less water).
 7. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive and negative.
 8. Service: Indoor or outdoor.

9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- C. Flanged Joint Sealant: Comply with ASTM C 920.
1. General: Single-component, acid-curing, silicone, elastomeric.
 2. Type: S.
 3. Grade: NS.
 4. Class: 25.
 5. Use: O.
 6. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.
- E. Round Duct Joint O-Ring Seals:
1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg (0.14 L/s per sq. m at 250 Pa) and shall be rated for 10-inch wg (2500-Pa) static-pressure class, positive or negative.
 2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
 3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.6 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1 (Table 4-1M), "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct."
- D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
- F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- H. Trapeze and Riser Supports:
1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
 2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.

3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.7 SEISMIC-RESTRAINT DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Cooper B-Line, Inc.; a division of Cooper Industries.
 2. Kinetics Noise Control.
 3. Mason Industries.
 4. TOLCO; a brand of NIBCO INC.
 5. Unistrut Corporation; Tyco International, Ltd.
- B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
 1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
- C. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.
- D. Restraint Cables: ASTM A 603, galvanized or ASTM A 492, stainless-steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.
- E. Hanger Rod Stiffener: Reinforcing steel angle clamped to hanger rod.
- F. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

- C. Install round ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.
- I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches (38 mm).
- K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Air Duct Accessories" for fire and smoke dampers.
- L. Protect duct interiors installed and/or stored on site from moisture, construction debris and dust, and other foreign materials.
 - 1. Cover and seal open ends of ducts with plastic wrap and duct tape.
 - 2. Turn off ventilation system and protect duct interiors from dust infiltration during dust producing activities (e.g. demolition, drywall installation, finishing).
 - 3. At the end of each workday, cover and seal open ends or openings of installed ducts with plastic wrap and duct tape.

3.2 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- B. Seal ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Where practical, install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches (100 mm) thick.
 - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.
 - 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1 (Table 4-1M), "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches (610 mm) of each elbow and within 48 inches (1200 mm) of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet (5 m).
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 SEISMIC-RESTRAINT-DEVICE INSTALLATION

- A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with ASCE/SEI 7.

- B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.
- C. Install cables so they do not bend across edges of adjacent equipment or building structure.
- D. Install cable restraints on ducts that are suspended with vibration isolators.
- E. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction.
- F. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.
- G. Drilling for and Setting Anchors:
 - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify the Architect if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - 4. Set anchors to manufacturer's recommended torque, using a torque wrench.
 - 5. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.

3.6 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Division 23 Section "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.7 PAINTING

- A. Paint exterior of metal ducts that are visible. Paint materials and application requirements are specified in Division 09 painting Sections.

3.8 DUCT CLEANING

- A. Clean new duct system(s) before testing, adjusting, and balancing.
- B. Clean the following components by removing surface contaminants and deposits:
 - 1. Air outlets and inlets (registers, grilles, and diffusers).

2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

3.9 START UP

- A. Air Balance: Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing for HVAC."

3.10 DUCT SCHEDULE

- A. Fabricate ducts with galvanized sheet steel except as otherwise indicated.
- B. Supply and Return Ducts:
 1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:
 - a. Pressure Class: Positive 2-inch wg (500 Pa).
 - b. Minimum SMACNA Seal Class: B.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
 2. Ducts Connected to Constant-Volume Air-Handling Units:
 - a. Pressure Class: Positive 2-inch wg (500 Pa).
 - b. Minimum SMACNA Seal Class: B.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
 3. Ducts Connected to Equipment Not Listed Above:
 - a. Pressure Class: Positive 2-inch wg (500 Pa).
 - b. Minimum SMACNA Seal Class: B.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
- C. Exhaust Ducts:
 1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
 - a. Pressure Class: Negative 2-inch wg (500 Pa).

- b. Minimum SMACNA Seal Class: B if negative pressure, and A if positive pressure.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
2. Ducts Connected to Equipment Not Listed Above:
- a. Pressure Class: Positive or negative 2-inch wg (500 Pa).
 - b. Minimum SMACNA Seal Class: B if negative pressure, and A if positive pressure.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
- D. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:
1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:
- a. Pressure Class: Positive or negative 1-inch wg (250 Pa).
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
- E. Intermediate Reinforcement:
1. Galvanized-Steel Ducts: Galvanized steel or carbon steel coated with zinc-chromate primer.
2. Stainless-Steel Ducts:
- a. Exposed to Airstream: Match duct material.
 - b. Not Exposed to Airstream: Match duct material.
- F. Liner:
- 1. Supply Air Ducts: Fibrous glass, Type II, 1-1/2 inches (38 mm) thick.
 - 2. Return Air Ducts: Fibrous glass, Type II, 1-1/2 inches (38 mm) thick.
 - 3. Supply Fan Plenums: Fibrous glass, Type II, 1-1/2 inches (38 mm) thick.
 - 4. Return- and Exhaust-Fan Plenums: Fibrous glass, Type II, 2 inches (51 mm) thick.
 - 5. Transfer Ducts: Fibrous glass, Type II, 1-1/2 inches (38 mm) thick.
 - 6. Supply, Return and Energy Recovery Ducts Exposed on Roof: Fibrous glass, Type II, 2 inches thick.
- G. Elbow Configuration:
1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Elbows."
- a. Velocity 1000 fpm (5 m/s) or Lower:

- 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.
- b. Velocity 1000 to 1500 fpm (5 to 7.6 m/s):
- 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
- c. Velocity 1500 fpm (7.6 m/s) or Higher:
- 1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Elbows."
- a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."
3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-3, "Round Duct Elbows."
- a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
 - 1) Velocity 1000 fpm (5 m/s) or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
 - 2) Velocity 1000 to 1500 fpm (5 to 7.6 m/s): 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
 - 3) Velocity 1500 fpm (7.6 m/s) or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
 - 4) Radius-to Diameter Ratio: 1.5.
 - b. Round Elbows, 12 Inches (305 mm) and Smaller in Diameter: Stamped or pleated.
 - c. Round Elbows, 14 Inches (356 mm) and Larger in Diameter: Spot welded seam.

H. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-6, "Branch Connections" and details provided on drawings.
 - a. Rectangular Main to Rectangular Branch: 45-degree entry.
 - b. Rectangular Main to Round Branch: 45 degree Lead-In,Low-loss.
2. Round: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and details provided on drawings.
 - a. All shall be 45-degree lateral.

END OF SECTION

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SECTION 23 31 16 – NONMETAL DUCTS

PART 1-GENERAL

1.01 DESCRIPTION OF WORK:

- A. Extent of non-metal ductwork is indicated on drawings and by requirements of this section.
- B. Types of non-metal ductwork required for this project include the following:
 - 1. Textile air Dispersion Products.

1.02 QUALITY ASSURANCE:

- A. Building Codes and Standards:
 - 1. Product must be Classified by Underwriter's Laboratories in accordance with the 25/50 flame spread / smoke developed requirements of NFPA 90-A and are also classified in accordance with ICC Evaluation Service AC167 and UL2518.
 - 2. All product sections must be labeled with the logo and classification marking of Underwriter's Laboratories.
 - 3. Product must be treated with an EPA registered antimicrobial agent.
 - 4. Green Product: Product must be constructed of a minimum 55% recycled content
 - 5. Fabrics shall meet minimum criteria or use in ISO Class 3 application as defined by ISO 14644-1.
- B. Design & Quality Control
 - 1. Manufacturer must have documented design support information including duct sizing, vent and orifice location, vent and orifice sizing, length, and suspension. Parameters for design, including maximum air temperature, velocity, pressure and fabric permeability, shall be considered and documented.

1.03 SUBMITTALS:

- A. Product Data: Submit manufacturer's specifications on materials and manufactured products used for work of this section.
- B. Building Code Data: Submit UL file number under which product is Classified by Underwriter's Laboratories for NFPA 90-A, ICC AC167 and UL2518.

1.04 WARRANTY

- A. Manufacturer must provide a 10 Year Product Warranty for products supplied for the fabric portion of this system as well as a Design and Performance Warranty.

1.05 DELIVERY, STORAGE AND HANDLING:

- A. Protect textile air dispersion systems from damage during shipping, storage and handling.
- B. Where possible, store products inside and protect from weather. Where necessary to store outside, store above grade and enclose with a vented waterproof wrapping.

PART 2 – PRODUCTS**2.01 MANUFACTURER:**

Subject to compliance with requirements, choose one of the following:

- A. DuctSox[®] Corporation
- B. Fabric Air

2.02 TEXTILE AIR DISPERSION SYSTEM:

- A. Sedona-Xm Fabric: Air diffusers shall be constructed of a woven fire-retardant fabric complying with the following physical characteristics:

- 1. Fabric Construction: Fabric shall be constructed of a polyester that includes 55% recycled content, treated with a machine wash-able anti-microbial agent by the fabric manufacturer, of a non-linting filament yarn to meet the requirements of ISO Class 3 environment, and 100% flame retardant.
- 2. Weight: 6.8 oz. /yd² per ASTM D3776
- 3. Color: From Manufacturer's standard colors as selected by District.
- 4. Fabric Porosity: 2 (+2/-1) cfm/ft² per ASTM D737, Frazier
- 5. Temperature Range: 0 degrees F to 180 degrees F
- 6. Fire Retardancy: Classified by Underwriters Laboratories in accordance with the flame spread/smoke developed requirements NFPA 90, ICC AC167 and UL 2518.
- 7. Antimicrobial agent shall be proven 99% effective after 10 laundry cycles per AATCC Test Method 100.
- 8. Customization, per major duct run (typ. of 2)
 - a. Three color logo screenprint, image provided by Owner, 2'-0" x 2'-0" maximum
 - b. Two color text screenprint, text provided by Owner, 25 characters maximum
 - c. Contractor to provide field mock-up of customization for Owner review and verification of image/text placement prior to final installation.

B. SYSTEMS FABRICATION REQUIREMENTS:

- 1. Air dispersion accomplished by linear vent and permeable fabric. Linear vents must be sized in 1 CFM per linear foot increments (based on .5" SP), starting a 1 CFM through 90 CFM per linear foot. Linear vent is to consist of an array of open orifices rather than a mesh style vent to reduce maintenance requirements of mesh style vents. Linear vents should also be designed to minimize dusting on fabric surface.

2. Size of vent openings and location of linear vents to be specified and approved by manufacturer.
3. Inlet connection to metal duct via fabric draw band with anchor patches as supplied by manufacturer. Anchor patches to be secured to metal duct via. zip screw fastener – supplied by contractor.
4. Inlet connection includes zipper for easy removal / maintenance.
5. Lengths to include required zippers as specified by manufacturer.
6. System to include Adjustable Flow Devices to balance turbulence, airflow and distribution as needed. Flow restriction device shall include ability to adjust the airflow resistance from 0.06 – 0.60 in w.g. static pressure.
7. End cap includes zipper for easy maintenance.
8. Fabric system shall include connectors to accommodate suspension system listed below.
9. Any deviation from a straight run shall be made using a gored elbow or an efficiency tee. Normal 90 degree elbows are 5 gores and the radius of the elbow is 1.5 times the diameter of the DuctSox.

C. DESIGN PARAMETERS:

1. Use fabric diffusers only for positive pressure air distribution components of the mechanical ventilation system.
2. Do not use fabric diffusers in concealed locations.
3. Fabric diffusers shall be designed from 0.25” water gage minimum to 3.0” maximum, with 0.5” as the standard.
2. Textile air diffusers shall be limited to design temperatures between 0 degrees F and 180 degrees F (-17.8 degrees C and 82 degrees C).
3. Design CFM, static pressure and diffuser length shall be designed or approved by the manufacturer.

D. SUSPENSION HARDWARE:

1. Tension Cable: System shall be installed using a tension cable system including a double (2 Row) run of cable. Double (2 Row) located 1-1/2” above the 10 and 2 o’clock locations. Hardware to include cable, eye bolts, thimbles, cable clamps, and turnbuckle(s) as required. System attachment shall be made using Glides spaced 24 inches or less.

Component options include:

- a. Galvanized Steel Cable
- b. Stainless Steel Cable
- c. Plastic Impregnated Steel Cable

Adjustable Mid-Supports – Available lengths: 5’, 10’, 15’, and 30’

PART 3 – INSTALLATION

3.01 INSTALLATION OF TEXTILE AIR DISPERSION SYSTEM:

- A. Install chosen suspension system in accordance with the requirements of the manufacturer. Instructions for installation shall be provided by the manufacturer with product.

3.02 CLEANING AND PROTECTION:

- A. Clean air handling unit and ductwork prior to the DuctSox system unit-by-unit as it is installed. Clean external surfaces of foreign substance which may cause corrosive deterioration of facing.
- B. Temporary Closure: At ends of ducts which are not connected to equipment or distribution devices at time of ductwork installation, cover with polyethylene film or other covering which will keep the system clean until installation is completed.
- C. If DuctSox systems become soiled during installation, they should be removed and cleaned following the manufacturers standard terms of laundry.

END OF SECTION

SECTION 23 33 00 – AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Backdraft and pressure relief dampers.
 - 2. Manual volume dampers.
 - 3. Combination fire and smoke dampers.
 - 4. Corridor dampers.
 - 5. Flange connectors.
 - 6. Turning vanes.
 - 7. Remote damper operators.
 - 8. Duct-mounted access doors.
 - 9. Flexible connectors.
 - 10. Flexible ducts.
 - 11. Duct accessory hardware.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with AMCA 500-D testing for damper rating.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G60.
 - 2. Exposed-Surface Finish: Mill phosphatized.
- C. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and No. 3 finish for exposed ducts.
- D. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- E. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.
- F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 BACKDRAFT AND PRESSURE RELIEF DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ventfabrics, Ventlok
 - 2. Duro Dyne Inc.
 - 3. Greenheck Fan Corporation.
 - 4. Nailor Industries Inc.
 - 5. Pottorff; a division of PCI Industries, Inc.
 - 6. Ruskin Company.
- B. Description: Gravity balanced.
- C. Maximum Air Velocity: 2000 fpm.
- D. Maximum System Pressure: 1-inch wg.
- E. Frame: 0.052-inch-thick, galvanized sheet steel, with welded corners and mounting flange.
- F. Blades: Multiple single-piece blades, maximum 6-inch width, [0.025-inch- thick, roll-formed aluminum with sealed edges.

- G. Blade Action: Parallel.
- H. Blade Seals: Vinyl foam.
- I. Blade Axles:
 - 1. Material: Galvanized steel or Stainless steel.
 - 2. Diameter: 0.20 inch.
- J. Return Spring: Adjustable tension.
- K. Bearings: Steel ball or Synthetic pivot bushings.
- L. Accessories:
 - 1. Adjustment device to permit setting for varying differential static pressure.
 - 2. Counterweights and spring-assist kits for vertical airflow installations.
 - 3. Electric actuators.
 - 4. Chain pulls.
 - 5. Screen Mounting: Front mounted in sleeve.
 - a. Sleeve Thickness: 20-gage minimum.
 - b. Sleeve Length: 6 inches minimum.
 - 6. Screen Mounting: Rear mounted.
 - 7. Screen Material: Galvanized steel or Aluminum.
 - 8. Screen Type: Bird.
 - 9. 90-degree stops.

2.3 MANUAL VOLUME DAMPERS

- A. Standard, Steel, Manual Volume Dampers:
 - 1. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
 - a. Ventfabrics, Ventlok.
 - b. McGill AirFlow LLC.
 - c. METALAIRE, Inc.
 - d. Nailor Industries Inc.
 - e. Pottorff; a division of PCI Industries, Inc.
 - f. Ruskin Company.
 - g. Duro Dyne Inc.
 - 2. Standard leakage rating, with linkage outside airstream.
 - 3. Suitable for horizontal or vertical applications.
 - 4. Frames:

- a. Hat-shaped, galvanized-steel channels, 0.064-inch minimum thickness.
 - b. Mitered and welded corners.
 - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
5. Blades:
- a. Multiple or single blade.
 - b. Parallel- or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Galvanized-steel, 0.064 inch thick.
6. Blade Axles: Galvanized steel or Stainless steel.
7. Bearings:
- a. Molded synthetic or Stainless-steel sleeve.
 - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
8. Tie Bars and Brackets: Galvanized steel.
- B. Jackshaft:
1. Size: 1-inch diameter.
 2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.
- C. Damper Hardware:
1. Zinc-plated, spring loaded, serrated die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
 2. Include center hole to suit damper operating-rod size.
 3. Include elevated platform for insulated duct mounting.

2.4 COMBINATION FIRE AND SMOKE DAMPERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Air Balance Inc.; a division of Mestek, Inc.
 2. Cesco Products; a division of Mestek, Inc.
 3. Greenheck Fan Corporation.
 4. Nailor Industries Inc.
 5. Ruskin Company.
- B. Type: Static and dynamic; rated and labeled according to UL 555 and UL 555S by an NRTL.
- C. Closing rating in ducts up to 4-inch wg static pressure class and minimum [2000-fpm] velocity.

- D. Fire Rating: 1-1/2 hours.
- E. Frame: Multiple-blade type; fabricated with roll-formed 5"x16 GA., 0.0625-inch-thick galvanized steel; with mitered and interlocking corners.
- F. Heat-Responsive Device: Electric resettable link and switch package, factory installed, 165 °F rated.
- G. Smoke Detector: Refer to Division 28.
- H. Blades: True airfoil shaped, single piece 14 ga. or double skin 16 and 20 ga. galvanized steel. Opposed action, maximum 6 inches width. Self-lubricating stainless steel sleeve bearings turning in extruded hole in frame.
- I. Leakage: Class II.
- J. Linkage: Concealed in frame.
- K. Axles: Minimum ½ inch diameter plated steel, hex shaped, mechanically attached to blade.
- L. Seals:
 - 1. Blade: Inflatable silicone fiberglass material to maintain smoke leakage rating to a minimum of 450°F and galvanized steel for flame seal to 1,900°F. Mechanically attached to blade edge (glue-on or grip type seals are not acceptable).
 - 2. Jamb: Stainless steel, flexible metal compression type.
- M. Rated pressure and velocity to exceed design airflow conditions.
- N. Mounting Sleeve: Factory-installed, minimum 20ga., galvanized sheet steel; length to suit wall or floor application with factory-applied silicone caulking.
- O. Actuator: Electric 120 volt, 60 HZ, two-position fail-close action.
- P. Accessories:
 - 1. Two position indicator switches linked directly to damper blade to remotely indicate damper blade position.

2.5 CORRIDOR DAMPERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Air Balance Inc.; a division of Mestek, Inc.
 - 2. Cesco Products; a division of Mestek, Inc.
 - 3. Nailor Industries Inc.
 - 4. Ruskin Company.
- B. General Requirements: Label combination fire and smoke dampers according to UL 555 for 1-hour rating and UL 555S Class 1 by an NRTL.

- C. Leakage Class: Class II.
- D. Heat-Responsive Device: Electric resettable link and switch package, factory installed, 165°F rated.
- E. Frame: Multiple-blade type; fabricated with roll-formed, 5"x16 ga, 0.0625-inch-thick galvanized steel; with mitered and interlocking corners.
- F. Blades: True airfoil shaped, single piece 14 ga. or double skin 16 and 20 ga. galvanized steel. Opposed action, maximum 6 inches width. Self-lubricating stainless steel sleeve bearings turning in extruded hole in frame.
- G. Linkage: Concealed in frame.
- H. Axles: Minimum ½ inch diameter plated steel, hex shaped, mechanically attached to blade.
- I. Seals:
 - 1. Blade: Inflatable silicone fiberglass material to maintain smoke leakage rating to a minimum of 450°F and galvanized steel for flame seal to 1,900°F. Mechanically attached to blade edge (glue-on or grip type seals are not acceptable).
 - 2. Jamb: Stainless steel, flexible metal compression type.
- J. Mounting Sleeve: Factory-installed, minimum 20 ga, galvanized sheet steel; length to suit wall or ceiling application with factory-applied silicone caulking.
- K. Actuator: Electric 120 volt, 60 HZ, Two-position fail-close action.

2.6 FLANGE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ductmate Industries, Inc.
 - 2. Nexus PDQ; Division of Shilco Holdings Inc.
 - 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Description: Roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.
- C. Material: Galvanized steel.
- D. Gage and Shape: Match connecting ductwork.

2.7 TURNING VANES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ductmate Industries, Inc.
 - 2. Duro Dyne Inc.

3. METALAIRE, Inc.
 4. SEMCO Incorporated.
 5. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
 6. Aero Dyne HEP
- B. Manufactured Turning Vanes for Metal Ducts: Double wall, hollow metal, airfoil shape blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.
- C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-3, "Vanes and Vane Runners," and 2-4, "Vane Support in Elbows."
- D. Vane Construction: Double wall.

2.8 REMOTE DAMPER OPERATORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Pottorff; a division of PCI Industries, Inc.
 2. Ventfabrics, Inc.
 3. Young Regulator Company.
- B. Description: Cable system designed for remote manual damper adjustment.
- C. Tubing: Brass.
- D. Cable: Stainless steel.
- E. Wall-Box Mounting: Recessed, 2 inches deep.
- F. Wall-Box Cover-Plate Material: Stainless steel.

2.9 DUCT-MOUNTED ACCESS DOORS

- A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
1. American Warming and Ventilating; a division of Mestek, Inc.
 2. Cesco Products; a division of Mestek, Inc.
 3. Ductmate Industries, Inc.
 4. Flexmaster U.S.A., Inc.
 5. Greenheck Fan Corporation.
 6. McGill AirFlow LLC.
 7. Nailor Industries Inc.
 8. Pottorff; a division of PCI Industries, Inc.

9. Ventfabrics, Inc.
 10. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-10, "Duct Access Doors and Panels," and 2-11, "Access Panels - Round Duct."
1. Door:
 - a. Double wall, rectangular.
 - b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
 - c. Vision panel.
 - d. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
 - e. Fabricate doors airtight and suitable for duct pressure class.
 2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
 3. Number of Hinges and Locks:
 - a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
 - b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.
 - c. Access Doors up to 24 by 48 Inches: Three hinges and two compression latches.
- C. Pressure Relief Access Door:
1. Door and Frame Material: Galvanized sheet steel.
 2. Door: Double wall with insulation fill with metal thickness applicable for duct pressure class.
 3. Operation: Open outward for positive-pressure ducts and inward for negative-pressure ducts.
 4. Factory set at 10-inch wg.
 5. Doors close when pressures are within set-point range.
 6. Hinge: Continuous piano.
 7. Latches: Cam.
 8. Seal: Neoprene or foam rubber.
 9. Insulation Fill: 1-inch-thick, fibrous-glass or polystyrene-foam board.

2.10 DUCT ACCESS PANEL ASSEMBLIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Ductmate Industries, Inc.
 2. Flame Gard, Inc.
 3. 3M.
- B. Labeled according to UL 1978 by an NRTL.
- C. Panel and Frame: Minimum thickness 0.0528-inch carbon steel.

- D. Fasteners: Carbon steel. Panel fasteners shall not penetrate duct wall.
- E. Gasket: Comply with NFPA 96; grease-tight, high-temperature ceramic fiber, rated for minimum 2000 deg F.
- F. Minimum Pressure Rating: 10-inch wg, positive or negative.

2.11 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ductmate Industries, Inc.
 - 2. Duro Dyne Inc.
 - 3. Ventfabrics, Inc.
 - 4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Materials: Flame-retardant or noncombustible fabrics.
- C. Coatings and Adhesives: Comply with UL 181, Class 1.
- D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to 2 strips of 2-3/4-inch-wide, 0.028-inch-thick, galvanized sheet steel or 0.032-inch-thick aluminum sheets. Provide metal compatible with connected ducts.
- E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - 1. Minimum Weight: 26 oz./sq. yd..
 - 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 - 3. Service Temperature: Minus 40 to plus 200 deg F.
- F. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
 - 1. Minimum Weight: 24 oz./sq. yd..
 - 2. Minimum Tensile Strength: 500 lbf/inch in the warp and 440 lbf/inch in the filling.
 - 3. Service Temperature: Minus 50 to plus 250 deg F.
- G. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.
 - 1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
 - 2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

2.12 FLEXIBLE DUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Flexmaster U.S.A., Inc.
 2. McGill AirFlow LLC.
 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
 4. J.P. Lamborn Co.
- B. Insulated, Flexible Duct: UL 181, Class 1, black polymer film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene or aluminized vapor-barrier film.
 1. Pressure Rating: 4-inch wg positive and 0.5-inch wg negative.
 2. Maximum Air Velocity: 4000 fpm.
 3. Temperature Range: Minus 20 to plus 175 deg F.
 4. Insulation R-Value: R-8.
- C. Flexible Duct Connectors:
 1. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action in sizes 3 through 18 inches, to suit duct size.
 2. Non-Clamp Connectors: Adhesive plus sheet metal screws.

2.13 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

- C. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
- D. Install volume dampers at points on supply, return, outside-air and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
 - 1. Install steel volume dampers in steel ducts.
 - 2. Install aluminum volume dampers in aluminum ducts.
- E. Set dampers to fully open position before testing, adjusting, and balancing.
- F. Install test holes at fan inlets and outlets and elsewhere as indicated.
- G. Install fire and smoke dampers according to UL listing.
- H. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 - 1. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
 - 2. Control devices requiring inspection.
 - 3. Kitchen exhaust ductwork.
 - 4. Elsewhere as indicated.
- I. Install access doors with swing against duct static pressure.
- J. Access Door Sizes:
 - 1. One-Hand or Inspection Access: 8 by 5 inches.
 - 2. Two-Hand Access: 12 by 6 inches.
 - 3. Head and Hand Access: 18 by 10 inches.
 - 4. Head and Shoulders Access: 21 by 14 inches.
 - 5. Body Access: 25 by 14 inches.
 - 6. Body plus Ladder Access: 25 by 17 inches.
- K. Label access doors according to Division 23 Section "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- L. Install flexible connectors to connect ducts to equipment.
- M. For fans developing static pressures of 5-inch wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- N. Connect terminal units to supply ducts directly.
- O. Connect diffusers or light troffer boots to ducts directly or with maximum 60-inch lengths of flexible duct clamped or strapped in place.

- P. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.
- Q. Install duct test holes where required for testing and balancing purposes.
- R. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop of fans.

3.2 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Operate dampers to verify full range of movement.
 - 2. Inspect locations of access doors and verify that purpose of access door can be performed.
 - 3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
 - 4. Inspect turning vanes for proper and secure installation.
 - 5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION

SECTION 23 34 23 – HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. In-line centrifugal fans.

1.3 PERFORMANCE REQUIREMENTS

- A. Project Altitude: Base fan-performance ratings on sea level.
- B. Operating Limits: Classify according to AMCA 99.

1.4 SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:
 - 1. Certified fan performance curves with system operating conditions indicated.
 - 2. Certified fan sound-power ratings.
 - 3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - 4. Material thickness and finishes, including color charts.
 - 5. Dampers, including housings, linkages, and operators.
 - 6. Fan speed controllers.
- B. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.
- C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

- D. UL Standard: Power ventilators shall comply with UL 705.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fans as factory-assembled unit, to the extent allowable by shipping limitations, with protective crating and covering.
- B. Disassemble and reassemble units, as required for moving to final location, according to manufacturer's written instructions.
- C. Lift and support units with manufacturer's designated lifting or supporting points.

1.7 COORDINATION

- A. Coordinate size and location of structural-steel support members.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations as detailed on plans

PART 2 - PRODUCTS

2.1 IN-LINE CENTRIFUGAL FANS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Greenheck
 - 2. Loren Cook Company.
 - 3. Carnes Company HVAC.
 - 4. Penn Ventilation.
- B. Description: In-line, direct-driven centrifugal fans consisting of housing, wheel, outlet guide vanes, fan shaft, bearings, motor and disconnect switch, drive assembly, mounting brackets, and accessories.
- C. Housing: Split, spun aluminum with aluminum straightening vanes, inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.
- D. Direct-Driven Units: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing.
- E. Direct Drive Motors:
 - 1. Open type motor enclosure with DC electronic commutation type motor (ECM) specifically designed for fan applications.
 - 2. Motors are permanently lubricated heavy duty ball bearing type to match with the fan load.
 - 3. Motor speed controllable down to 20% of full speed, controlled by either a potentiometer dial mounted at the motor or by a 0-10 VDC signal
 - 4. Motor shall be a minimum 85% efficient at all speeds.

- F. Fan Wheels: Aluminum, airfoil blades welded to aluminum hub.
- G. Accessories:
 - 1. Companion Flanges: For inlet and outlet duct connections.

2.2 MOTORS

- A. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."

2.3 SOURCE QUALITY CONTROL

- A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
- B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install power ventilators level and plumb.
- B. Install units with clearances for service and maintenance.
- C. Label units according to requirements specified in Division 23 Section "Identification for HVAC Piping and Equipment."

3.2 CONNECTIONS

- A. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 23 Section "Air Duct Accessories."
- B. Install ducts adjacent to power ventilators to allow service and maintenance.
- C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
1. Verify that shipping, blocking, and bracing are removed.
 2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 3. Verify that cleaning and adjusting are complete.
 4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
 5. Adjust belt tension.
 6. Adjust damper linkages for proper damper operation.
 7. Verify lubrication for bearings and other moving parts.
 8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
 9. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
 10. Shut unit down and reconnect automatic temperature-control operators.
 11. Remove and replace malfunctioning units and retest as specified above.
- B. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Adjust belt tension.
- C. Refer to Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.
- D. Replace fan and motor pulleys as required to achieve design airflow.
- E. Lubricate bearings.

END OF SECTION

SECTION 23 34 33 – AIR CURTAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes air curtains.

1.3 SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each unit.
- B. Operation and Maintenance Data: For air curtains to include in maintenance manuals.
- C. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of air curtains and are based on the specific product indicated. Refer to Division 01 Section "Product Requirements."
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in the California Electrical Code, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with AMCA 220, "Test Methods for Air Curtain Units," for airflow, outlet velocity, and power consumption.
- D. ETL Sanitation Listed to comply with NSF 37, "Air Curtains for Entranceways in Food and Food Service Establishments."

1.5 COORDINATION

- A. Coordinate layout and installation of air curtains and suspension system components with other construction, including light fixtures, fire-suppression-system components, and partition assemblies.
- B. Coordinate installation of wall penetrations and louvers. These items are specified in Division 08 Section "Louvers and Vents."

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of air curtains that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period (Nonheating Units): Five years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Air Economy Corporation.
 - 2. Berner International Corp.
 - 3. Biddle Air Systems Limited.
 - 4. Cambridge Engineering, Inc.
 - 5. Disco Engineering, Inc.
 - 6. Fantech.
 - 7. KING.
 - 8. Loren Cook Company.
 - 9. Marley Engineered Products.
 - 10. Mars Air Products
 - 11. MesTec AG; L. J. Wing Division.
 - 12. Miniveil Air Systems.
 - 13. TMI Inc.

2.2 MATERIALS

- A. Housing Materials: Galvanized steel with electrostatically applied polyurethane powder coating.
 - 1. Mounting Brackets: Steel, for wall mounting.
- B. Intake Louvers: Integral part of the housing, mechanically field adjustable and capable of reducing air-outlet velocity by 60 percent with louver in totally closed position.
- C. Discharge Nozzle: Integral part of the housing, containing adjustable air-directional vanes with 40-degree sweep front to back.

2.3 FANS

- A. Fans: Aluminum, Centrifugal, forward curved, double width, double inlet; statically and dynamically balanced.
- B. Fan Drives: Direct

2.4 MOTORS

- A. Motor Type: Multispeed, resiliently mounted, continuous duty, totally enclosed, air over, with integral thermal-overload protection.
- B. Bearings: Permanently sealed, lifetime, prelubricated, ball bearings.
- C. Disconnect: Internal power cord with plug and receptacle.

2.5 FILTERS

- A. Washable Panel Filters: Removable, aluminum, baffle-type filters with spring-loaded fastening; with minimum 0.0781-inch-thick, stainless-steel filter frame.
- B. Mounting Frames: Welded, galvanized steel with gaskets and fasteners and suitable for bolting together into built-up filter banks.

2.6 ACCESSORIES

- A. Automatic Door Switch: Plunger type installed in door area to activate air curtain when door opens and to deactivate air curtain when door closes.
- B. Start-Stop, Push-Button Switch: Manually activates and deactivates air curtain.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions where air curtains will be installed for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install air curtains with clearance for equipment service and maintenance.

3.3 CONNECTIONS

- A. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- B. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. After installing air curtains completely, perform visual and mechanical check of individual components.
 - 2. After electrical circuitry has been energized, start unit to confirm motor rotation and unit operation. Certify compliance with test parameters.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Repair or replace malfunctioning units and retest as specified above.

3.5 ADJUSTING

- A. Adjust motor and fan speed to achieve specified airflow.
- B. Adjust discharge louver and dampers to regulate airflow.
- C. Adjust air-directional vanes.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air curtains. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION

SECTION 23 54 00 – FURNACES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Gas-fired, noncondensing furnaces and accessories complete with controls.

1.3 SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each of the products indicated.
- B. Operation and Maintenance Data: For each furnace to include in emergency, operation, and maintenance manuals for each furnace, including accessories and controls.
- C. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
- C. ASHRAE/IESNA 90.1-2004 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6 - "Heating, Ventilating, and Air-Conditioning."
- D. Comply with NFPA 70.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace the following components of furnaces that fail in materials or workmanship within specified warranty period:
 - 1. Warranty Period, Commencing on Date of Substantial Completion:

- a. Furnace Heat Exchanger: 10 years.

PART 2 - PRODUCTS

2.1 GAS-FIRED FURNACES, NONCONDENSING

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Carrier Corporation; Div. of United Technologies Corp.
 2. Comfort-Aire; a division of Heat Controller, Inc.
 3. Goodman Manufacturing Company, L.P.
- B. General Requirements for Gas-Fired, Noncondensing Furnaces: Factory assembled, piped, wired, and tested; complying with ANSI Z21.47/CSA 2.3, "Gas-Fired Central Furnaces," and with NFPA 54.
- C. Cabinet: Galvanized steel.
 1. Cabinet interior around heat exchanger shall be factory-installed insulation.
 2. Lift-out panels shall expose burners and all other items requiring access for maintenance.
 3. Factory paint external cabinets in manufacturer's standard color.
 4. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
- D. Fan: Centrifugal, factory balanced, resilient mounted, drive type indicated on Drawings.
 1. Fan Motors: Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
 2. Special Motor Features: Single speed, Premium (TM) efficiency, as defined in Division 23 Section "Common Motor Requirements for HVAC Equipment," and with internal thermal protection and permanent lubrication.
 3. Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.
 4. Special Motor Features: Electronically controlled motor (ECM) controlled by integrated furnace/blower control.
- E. Type of Gas: Natural.
- F. Heat Exchanger: Aluminized steel.
- G. Burner:
 1. Gas Valve: 100 percent safety modulating main gas valve, main shutoff valve, pressure regulator, safety pilot with electronic flame sensor, limit control, transformer, and combination ignition/fan timer control board.
 2. Ignition: Electric pilot ignition, with hot-surface igniter or electric spark ignition.
- H. Gas-Burner Safety Controls:

1. Electronic Flame Sensor: Prevents gas valve from opening until pilot flame is proven; stops gas flow on ignition failure.
 2. Flame Rollout Switch: Installed on burner box; prevents burner operation.
 3. Limit Control: Fixed stop at maximum permissible setting; de-energizes burner on excessive bonnet temperature; automatic reset.
- I. Combustion-Air Inducer: Centrifugal fan with thermally protected motor and sleeve bearings prepurges heat exchanger and vents combustion products; pressure switch prevents furnace operation if combustion-air inlet or flue outlet is blocked.
- J. Furnace Controls: Solid-state board integrates ignition, heat, cooling, and fan speeds; and adjustable fan-on and fan-off timing; terminals for connection to accessories.
- K. Vent Materials: Comply with requirements in Division 23 Section "Breechings, Chimneys, and Stacks" for Type B metal vents.
- L. Capacities and Characteristics:
1. Airflow Configuration: Upflow.
 2. Gas:
 - a. Type: Natural.
 - b. Venting Type: Power venter.
 - c. Minimum Thermal Efficiency: 80 percent.
 3. Furnace Electrical Connection:
 - a. Volts: 115.
 - b. Phase: 1.

2.2 THERMOSTATS

- A. Solid-State Thermostat: Wall-mounting, programmable, microprocessor-based unit with manual switching from heating to cooling, preferential rate control, seven-day programmability with minimum of four temperature presets per day, and battery backup protection against power failure for program settings.
- B. Control Wiring: Unshielded twisted-pair cabling.
1. No. 24 AWG, 100 ohm, four pair.
 2. Cable Jacket Color: Blue.
- C. Controls shall comply with requirements in ASHRAE/IESNA 90.1-2004, "Controls."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine factory-installed insulation before furnace installation. Reject units that are wet, moisture damaged, or mold damaged.
- C. Examine roughing-in for gas piping systems to verify actual locations of piping connections before equipment installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install gas-fired furnaces and associated fuel and vent features and systems according to NFPA 54.
- B. Base-Mounted Units: Secure units to substrate. Provide optional bottom closure base if required by installation conditions.
 - 1. Anchor furnace to substrate to resist code-required seismic acceleration.
- C. Controls: Install thermostats and humidistats at mounting height of 60 inches above floor.
- D. Wiring Method: Install control wiring in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal control wiring except in unfinished spaces.
- E. Install ground-mounted, compressor-condenser components on 4-inch-thick, reinforced concrete base; 4 inches larger on each side than unit. Concrete, reinforcement, and formwork are specified in Division 03 Section "Cast-in-Place Concrete." Coordinate anchor installation with concrete base.
- F. Install ground-mounted, compressor-condenser components on polyethylene mounting base.

3.3 CONNECTIONS

- A. Gas piping installation requirements are specified in Division 22 Section "Plumbing." Drawings indicate general arrangement of piping, fittings, and specialties. Connect gas piping with union or flange and appliance connector valve.
- B. Install piping adjacent to equipment to allow service and maintenance.
- C. Vent Connection, Noncondensing, Gas-Fired Furnaces: Connect Type B vents to furnace vent connection and extend outdoors. Type B vents and their installation requirements are specified in Division 23 Section "Breechings, Chimneys, and Stacks"

- D. Connect ducts to furnace with flexible connector. Comply with requirements in Division 23 Section "Air Duct Accessories."

3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. Perform electrical test and visual and mechanical inspection.
 - 2. Leak Test: After installation, charge systems with refrigerant and oil and test for leaks. Repair leaks, replace lost refrigerant and oil, and retest until no leaks exist.
 - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation, product capability, and compliance with requirements.
 - 4. Verify that fan wheel is rotating in the correct direction and is not vibrating or binding.
 - 5. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.

3.5 STARTUP SERVICE

- A. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
 - 1. Inspect for physical damage to unit casings.
 - 2. Verify that access doors move freely and are weathertight.
 - 3. Clean units and inspect for construction debris.
 - 4. Verify that all bolts and screws are tight.
 - 5. Adjust vibration isolation and flexible connections.
 - 6. Verify that controls are connected and operational.
- B. Adjust fan belts to proper alignment and tension.
- C. Start unit according to manufacturer's written instructions and complete manufacturer's operational checklist.
- D. Measure and record airflows.
- E. Verify proper operation of capacity control device.
- F. After startup and performance test, lubricate bearings[**and adjust belt tension**].

3.6 ADJUSTING

- A. Adjust initial temperature and humidity set points.
- B. Set controls, burner, and other adjustments for optimum heating performance and efficiency. Adjust heat-distribution features, including shutters, dampers, and relays, to provide optimum heating performance and system efficiency.

3.7 CLEANING

- A. After completing installation, clean furnaces internally according to manufacturer's written instructions.
- B. Install new filters in each furnace within 14 days after Substantial Completion.

3.8 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain condensing units. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION

SECTION 23 81 26 – SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes ductless single zone split-system air-conditioning and heat pump units consisting of separate evaporator-fan and compressor-condenser components. Units are designed for exposed or concealed mounting and may be connected to ducts.

1.3 SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.
- D. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of split-system units and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
- D. ASHRAE/IESNA 90.1-2004 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.5 COORDINATION

- A. Coordinate size, location, and connection details with roof curbs, equipment supports, and roof penetrations specified in Division 07 Section "Roof Accessories."

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Carrier.
 - 2. Mitsubishi.
 - 3. Daikin AC.

2.2 WALL-MOUNTING, EVAPORATOR-FAN COMPONENTS

- A. Cabinet: Heavy duty ABS and high impact polystyrene plastic with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.
 - 1. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
 - 2. Drain Pan and Drain Connection: Comply with ASHRAE 62.1-2004.
- B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.
- C. Fan: Direct drive, centrifugal fan.
- D. Fan Motors: Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
 - 1. Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.
- E. Filters: Permanent, cleanable

2.3 CONCEALED EVAPORATOR-FAN COMPONENTS

- A. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
 - 1. Insulation: Faced, glass-fiber duct liner.
 - 2. Drain Pans: Galvanized steel, with connection for drain; insulated and complying with ASHRAE 62.1-2004.
 - 3. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
- B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.
- C. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
- D. Fan Motors: Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
 - 1. Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.
- E. Filters: Minimum MERV-13.
- F. Wiring Terminations: Connect motor to chassis wiring with plug connection.

2.4 AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS

- A. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
- B. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - 1. Compressor Type: Twin Rotary.
 - 2. Digitally controlled inverter driven compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
 - 3. Refrigerant: R-407C or R-410A.
- C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.
- D. Heat Pump Components: Reversing valve and low-temperature air cut-off thermostat.
- E. Fan: Aluminum-propeller type, directly connected to motor.
- F. Motor: Permanently lubricated, with integral thermal-overload protection.

- G. Low Ambient Kit: Permits operation down to 45 deg F.
- H. Mounting Base: Polyethylene.
- I. Minimum Energy Efficiency: Comply with ASHRAE/IESNA 90.1-2004, "Energy Standard for Buildings except Low-Rise Residential Buildings."

2.5 ACCESSORIES

- A. Control equipment and sequence of operation are specified in Division 25 "Direct Digital Control and Energy Management System."
- B. Thermostat: Low voltage with subbase to control compressor and evaporator fan.
 - 1. Compressor time delay.
 - 2. 24-hour time control of system stop and start.
 - 3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
 - 4. Fan-speed selection, including auto setting.
- C. Automatic-reset timer to prevent rapid cycling of compressor.
- D. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.
 - 1. Minimum Insulation Thickness: 1 inch thick where indoors, 1-1/2 inch thick with aluminum jacketing where outdoors.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units level and plumb.
- B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C. Install roof-mounting compressor-condenser components on equipment supports as detailed on the drawings. Anchor units to supports with removable, cadmium-plated fasteners.
- D. Install seismic restraints.
- E. Install and connect pre-charged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to unit to allow service and maintenance.
- C. Duct Connections: Duct installation requirements are specified in Division 23 Section "Metal Ducts." Drawings indicate the general arrangement of ducts. Connect outside air, supply and return ducts to split-system air-conditioning units with flexible duct connectors. Flexible duct connectors are specified in Division 23 Section "Air Duct Accessories."
- D. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- E. Electrical Connections: Comply with requirements in Division 26 Sections for power wiring, switches, and motor controls.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace malfunctioning units and retest as specified above.

3.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.

END OF SECTION

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SECTION 26 00 00 – ELECTRICAL

PART 1 – GENERAL

1.01 RELATED DOCUMENTS:

Contact requirements of the foregoing GENERAL CONDITIONS, SPECIAL CONDITIONS and supplements thereto and all requirements of Division 1 of these Specifications shall form a part of this Section with the same force and effect as though repeated herein. The provisions of this Section shall apply to all of the following Sections of Division 26 of these Specifications. All applicable portions of the work under Division 26 shall conform fully to all provisions of all other Division 16 Sections along with other Sections of these Specifications.

1.02 SUMMARY OF WORK:

The Contractor shall provide all materials, tools, equipment, labor and services necessary to furnish and install complete working electrical systems as shown on the plans and described within these Specification. All systems, at project completion and before final acceptance, shall be demonstrated to have a complete and working functional operation. The work includes but is not specifically limited to items indicated on Drawings and specified herein.

1.03 DESCRIPTION AND INSTALLATION OF SYSTEMS:

- A. The electrical drawings are diagrammatic and do not necessarily show all raceway, wiring, number or types of fittings, offsets, bends or exact locations of items required by the electrical systems. Items not shown or indicated which are clearly necessary for proper operation, payment or installation of systems shown shall be provided at no-increase in contract price.
- B. The exact routing of systems and location of devices and equipment shall be governed by coordination with other trades, structural and architectural conditions. The Architect or Electrical Engineer reserves the right, at no increase in contract price, to make reasonable changes in location of electrical equipment or wiring systems; so as to coordinate with other systems, group them into orderly relationships, or to increase their utility. Contractor shall verify requirements in this regard prior to roughing in.
- C. Install electrical work in cooperation with other trades and make proper provisions to avoid interferences and coordinate with structural and architectural features, in a manner approved by the Architect or Electrical Engineer. All changes caused by neglect to make such provisions shall be at Contractor's expense. Provide offsets and special fittings, as required to facilitate installation of the work.
- D. When a particular product or type of product is specified with a manufacturer's designation, the latest published specifications, installation, and construction information of the manufacturer shall constitute the minimum acceptable standard. Any substitutions shall be made in accordance with Section 1.09 SUBSTITUTIONS.

1.04 RELATED DOCUMENTS:

A. Codes and Regulations: All electrical equipment and material and its installation shall conform to the current requirements of the following authorities and Section 01-080 CODES AND STANDARDS:

1. Occupational Safety and Health Act (OSHA).
2. 2019 California Electric Code (CEC)
3. California Code of Regulations (CCR).
 - a. Title 8, Safety Orders.
 - b. Title 19, Fire and Panic Safety Standard.
 - c. Title 24, Part 1, Administrative Regulations.
4. California Fire Code
5. California Building Code (Based on the International Building Code, now incorporated as CCR-T24, Part 2.)

NOTE: Where two or more codes conflict, the most restrictive shall apply. Nothing in these Drawings and Specifications shall be construed to permit work not conforming to applicable codes.

B. Tests and Standards: The tests, standards, or recommended procedures of the following agencies shall relate to all parts of these Specifications and shall be considered a minimum:

1. American National Standards Institute (ANSI).
2. Underwriters Laboratories, Inc. (UL).
3. National Electric Manufacturers Association (NEMA).
4. Electrical Testing Laboratories (ETL).
5. National Fire Protection Association (NFPA).
6. Insulated Power Cable Engineers Association (IPCEA).
7. Institute of Electrical and Electronic Engineers (IEEE).
8. Illumination Engineering Society (IES).

1.05 EXAMINATION OF DOCUMENTS AND SITE:

Before submitting a proposal, each bidder shall carefully examine the electrical, mechanical, architectural, and structural drawings and specifications. He shall also visit the site and fully inform himself as to all existing conditions and limitations applying to the work. If, after such examination and study, it appears that any change from the drawings and specifications should be allowed, the bidder shall so state in writing together with any change in cost involved.

By the act of submitting a proposal, each bidder shall be deemed to have made such examinations of the drawings and specifications and premises, and it will be assumed that he is therefore familiar with the entire scope of the project and has based his proposal upon the work described in the Drawings and Specifications and upon all existing conditions and limitations applying to his work.

1.06 EXECUTION:

- A. Workmanship: The work shall be performed by competent workmen, skilled in the particular phase of the work entailed. The work shall be first class throughout, neat, accurate and in full accordance with the intent of these Specifications and the satisfaction of the Architect or Electrical Engineer.
- B. Safety: All standard safety procedures as set forth by OSHA, CCR, and California Division of Industrial Safety shall be strictly adhered to.
- C. Coordination: The Contractor shall familiarize himself with the work of other crafts so as to be able to provide electrical service of correct size and voltage and other requirements to any equipment to be installed. The installations shall be coordinated as to location and time, and interference causing delays and non-acceptable construction shall be avoided.

Prior to commencing construction the Electrical Contractor shall arrange a conference with the general and sub-contractors as well as equipment suppliers and shall verify types, sizes, locations, requirements, controls, and diagrams of all equipment furnished by them.

Exact equipment rough-in locations shall be verified from shop drawings.

- D. Cutting and Repairing: The Electrical Contractor shall do all cutting necessary for the proper installation of his work, repair any damage done by himself or his workmen, and coordinate his work with that of others. Do no cutting or patching without approval of the Architect or Electrical Engineer. Round holes through concrete slabs or walls shall be core drilled with a diamond drill, rectangular openings shall be cut with a diamond saw. In no case shall any concrete beam or column be cut.
- E. Sleeves and Openings: Electrical Contractor shall be responsible for all sleeves and openings through walls and floors required by electrical work. All openings around conduits in sleeves shall be sealed with a material of equal fire rating as the surface penetrated. Openings not utilized shall be temporarily sealed in a similar manner. All required sleeves shall be furnished to and coordinated with the General Contractor.
- F. Cleaning and Painting: All exposed work shall be thoroughly cleaned upon completion of work. All panelboards and equipment not located in electrical or mechanical rooms or

closets shall be field painted per painting specifications, color as selected by Architect. Panelboard enclosures, fixtures, and equipment, where finish has been marred in shipment or installation, shall be completely refinished. Minor finish damage shall be rectified as indicated by the Architect or Electrical Engineer. Contractor shall remove all waste and rubbish resulting from his work from the site.

1.07 QUALITY CONTROL:

- A. Supervision: The Contractor shall personally, or through a competent representative, constantly supervise the work from beginning to completion and final acceptance. He shall cooperate fully with the inspection authorities in the provision of information and access to the work. He shall, to the best of his ability, maintain the same job foreman throughout the life of the project unless a replacement is requested or authorized by the Architect or Electrical Engineer.
- B. Inspection and Tests: The Contractor shall furnish all labor and test equipment required to fully test and adjust the equipment installed under this specification and demonstrate its proper operation.
 - 1. Arrange for all tests and inspections and provide minimum 48 hours notice to the Architect or Electrical Engineer.
 - 2. A test must demonstrate that each piece of equipment, outlet, fixture, device, and appurtenance is in sound operating condition and in proper cooperative relation to associated equipment.
 - 3. All tests shall be conducted under supervision of the Architect or Electrical Engineer, and any defects of any nature which are apparent as a result of such test shall be made correct to the satisfaction of the Architect or Electrical Engineer before final acceptance is made.
 - 4. No equipment shall be tested, or operated for any other purpose, such as checking motor rotation, until it has been fully checked in accordance with the manufacturer's instructions.
- C. Warranty: The Contractor agrees to replace or repair, to the satisfaction of the Owner, any part of the installation which may fail due to defective material and/or workmanship or failure to follow Drawings and Specifications, for a period of one year after final acceptance. Any damage to other work resulting from such failure or the correction thereof shall be remedied at the Contractor's expense. The Contractor shall, further, secure from the manufacturers of special equipment, such as signal systems, their respective guarantees and deliver same to Owner. Guarantees between Contractor and his suppliers shall not affect warranties between Contractor and Owner.

1.08 GROUNDING:

- A. The conduit system supports, cabinets, switchboards, etc., and neutral conductors must be permanently and effectively grounded by means of approved ground clamp, in accordance with the electrical safety orders of the Department of Industrial Relations of the State of California.

- B. This Contractor shall exercise every precaution to obtain good contacts at all panel boxes, pull boxes, etc. Where it is not possible to obtain good contacts, the conduit shall be bonded around the boxes with a #6 B&S gauge, rubber covered, double braided wire with ground clamps.
- C. Equipment and raceway bonding procedures shall be rigidly maintained and meet all jurisdictional requirements of codes and regulations.
- D. A separate grounding conductor shall be run in all receptacle circuits.

1.09 SUBSTITUTIONS:

- A. The Specifications or Drawings are in no way to be construed as being proprietary toward one product. Those products, or types of products, listed are intended to set the standard for quality, design, and installation procedure. However, no right is implied upon the part of the Contractor to substitute other materials, products or systems without the written approval of the Architect or Engineer.
- B. All requests for substitution shall be made in accordance with Section 01-640 of the General requirements - SUBSTITUTIONS.
- C. All requests for substitutions shall be in writing, received at least 14 days prior to bid date, and shall indicate all information required thereon including differences from the specified item. The request for substitution shall be accompanied by cuts, product literature, performance data, specifications, drawings, samples or other means as may be required for proper evaluation by the Architect or Electrical Engineer.
- D. All proposed substitutions shall be standard product of the firm under current manufacture and be a catalog item at time of bid.
- E. Acceptance of substitution shall not relieve the Contractor from responsibility for complying with requirements of the Contract Documents. The Contractor shall be responsible for changes in other parts of the work occasioned by his substitutions and shall bear their expense.
- F. Representative samples may be required for determination of equality.

1.10 SUBMITTAL:

- A. Make submittal for all material to be used on the project, whether as specified or substitutions, within thirty five (35) days after award of Contract by the Owner, in accordance with Section 013300, Submittal Procedures, and the following:
 - 1. All submittal shall be neat and bound in a suitable folder or binder.
 - 2. Identify each item by manufacturer, brand, trade, name, number, size, rating, and whatever other data is necessary to properly identify and check materials and equipment. Words "as specified" are not sufficient identification.
 - 3. Identify each submittal item by reference to specifications section paragraph in which item is specified, or Drawings and Detail Number.

4. All submittal shall be submitted in coherent groups, e.g. all light fixtures at one time. No partial, or incomplete submittal will be accepted.
 5. Organize submittal in same sequence as they appear in specification sections, articles or paragraphs.
- B. Product Data: Submit eight copies, in groups, as follows:
1. Boxes, pullboxes, conduits, and raceway types required, including fittings
 2. Electric Wire, cable and connectors
 3. Circuit breakers, Panelboards, Transformers, and disconnects.
 4. Lighting fixtures and Controls
 5. Wiring Devices
 6. Fire Alarm System Equipment
- C. Shop Drawings: Shop drawings shall show physical arrangement, wiring diagram, construction details, finishes, materials used in fabrication, provisions for conduit entrance, access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, weight, power sources, circuit numbers, and shall be compatible with the Contract Drawings and Specifications.

Show wiring as actually installed, connected, and identified for this specific project. Include identification of cables and cable conductors.

Shop and instruction drawings shall cover the equipment or device to be installed and not merely the general class of such equipment or device.

1.11 DOCUMENTATION:

- A. Construction Record Drawings: The Contractor shall furnish to the Architect or Engineer, in accordance with the GENERAL REQUIREMENTS, a complete set of "as constructed" drawings which clearly indicate all deviations from the basic contract drawings, including exact dimension locations and depths for all stubbed conduits, location and size of spare conduits, & conductors, all new and uncovered existing work outside the buildings, power feeder runs, and communications "primary" conduit runs. Corrections and changes shall be kept up to date at all times.
- B. All submittal and shop drawings will be resubmitted with record drawings showing all revisions and changes made, clearly marked with field termination wire so as to reflect actual construction record conditions. Revisions and changes will be enumerated and new dates of drawings shown.

1.12 PORTABLE OR DETACHABLE PARTS:

The Contractor shall retain in his possession and shall be responsible for all portable and detachable parts or portions of the installation such as fuses, keys, locks, adapters, locking clips, and inserts until final completion of his work. These parts shall be itemized and delivered to the Owner at Project Closeout.

END OF SECTION

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SECTION 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 – GENERAL

1.01 SCOPE:

Furnish and install material and equipment as indicated on the drawings and as specified.

1.02 MATERIALS AND EQUIPMENT:

Shall be new and of the best quality used for the purpose in good commercial practice.

1.03 UL APPROVAL:

All material and equipment within the scope of the UL re-examination service shall be approved by the Underwriters' Laboratories for the purpose for which they are used and shall bear their label.

1.04 STORAGE:

All material and equipment shall be stored in a manner to prevent damage or corrosion. Equipment with components which can be damaged due to moisture shall be placed in special heated storage facilities.

1.05 DRAWINGS:

Drawings for all equipment are intended to be diagrammatic only. Any location not actual dimension is not to be considered as necessarily final or accurate. Exact locations must be determined in the field from the requirements of the equipment that is to be installed.

1.06 COORDINATION:

Before rough-in of any utility lines, services, and feeders, or of any equipment, this Contractor must coordinate his work with that of other crafts and trades so that these services shall be installed in their proper locations and without interference to the equipment or building structure. This will require cooperation among all crafts and trades, the inspector, and General Contractor, along with study of shop drawings and the building drawings.

1.07 ELECTRICAL WORK EXPOSED TO WEATHER:

- A. All electrical devices and equipment installed in exposed locations shall be protected by suitable NEMA type 3R enclosures, cast boxes with gasketed covers, or other Engineer approved methods.
- B. All ferrous metal portions of electrical work exposed to weather including conduits, clamps, supports, etc. shall be hot-dip galvanized.

1.08 SEISMIC ANCHORAGE:

- A. Provide complete seismic anchorage and bracing for the lateral and vertical support of conduit and electrical equipment, as required by Section 1617A.1.18 through 1617A.1.26 of the California Building Code, and the following.
- B. Anchorage of Equipment: All mechanical and electrical equipment shall be braced or anchored to resist a horizontal force acting in any direction using the following criteria:
- Fixed equipment on grade - - - - 33% of operating weight
 Fixed equipment on structure - - 50% of operating weight
 Emergency power and communication
 equipment on grade - - - - - 50% of operating weight
 Emergency power and communication
 equipment on structure - - - - 75% of operating weight
 For flexibly mounted equipment use 2 x the above values.
 Simultaneous vertical force - use 1/3 horizontal force.
- C. Submit calculations prepared and signed by a Structural Engineer licensed in the State of California, showing compliance with the above for all electrical equipment weighing more than 50 pounds, excepting items corresponding exactly in configuration and weight to those specified and detailed. Where anchorage details are not shown on drawings, the field installation shall be subject to the approval of the Electrical Engineer.
- D. Conduit that crosses structural separation between buildings or building units shall be installed with flexible connections, suitable to accommodate longitudinal and transverse displacements.

1.09 SUBMITTAL:

- A. Product Data: Submit manufacturer's data including specifications, installation instruction and general recommendations for each item submitted under Submittal, Section 260000.

PART 2 – PRODUCTS

2.01 RACEWAYS:

- A. Unless specifically noted otherwise on the plans or in these specifications, the Contractor shall furnish and install a complete, galvanized rigid steel, threaded conduit system for all wiring including control and signal wiring.
- B. Galvanized Steel Conduit (GRC)
1. Conduit shall be rigid threaded hot dipped galvanized type.
 2. Joints are to be sealed with conductive pipe compound T&B "Kopr-Shield" before making up. Conduits installed below grade shall be wrapped with 3M "Scotchrap #51" corrosion protection tape using half-laps for double thickness. Conduit surfaces are to be clean and dry before wrapping.

3. Unthreaded fittings (e.g. compression type fittings) are not allowed.
- C. Steel Electrical Metal Tubing (EMT)
1. Allied True Color E-Z Pull, or equal
 2. Trade sizes 4" and smaller may be used within hollow dry spaces of the building such as walls, attic spaces, and equipment rooms.
 3. In normally occupied areas, EMT may be run in lieu of GRC exposed above 8' above finished floor.
 4. EMT shall have a colored finish specific to the following systems:
 - a) Natural: Power & Lighting
 - b) Blue: Copper Data & Communications
 - c) Orange: Fiber Optic Cable
 - d) Red: Fire Alarm
 5. All raceway fittings, locknuts, couplings, elbows, etc., shall be hot dipped galvanized steel finish with plastic throats or bushings. No cast-type fittings shall be used.
- D. Non-Metallic Polyvinylchloride Conduit (PVC)
1. Rigid nonmetallic PVC, schedule 40, UL labeled and fittings approved for the purpose may be used under the following conditions:
 - a) All conduits in earth under buildings or protected by permanent paving may be Schedule 40 PVC. Any conduits running through planters or unprotected are to be encased in 3" of concrete. All raceways above grade are to be steel.
 - b) All nonmetallic runs shall have a bond wire for the interconnecting of all conducting portions per Article 250 of the California Electric Code.
 - c) Use blue color, factory PVC coated T&B "Ocal" steel ells. Bends less than 90 degrees and offsets may be field bent.
 2. PVC shall not be used as a transition through grade or above grade or in exposed locations, unless specifically noted otherwise.
- E. Liquid-Tight Flexible Metal Conduit (LFMC):
1. LMFC may be used in lengths not greater than 36" at motors and other machinery to prevent the transmission of vibration. LFMC shall be supported at both ends.

2. LMFC shall not be used to connect equipment on roofs where EMT may be reasonably installed.
- F. Metal Clad Cable (MC)
1. MC cable may be used for room-level branch circuiting; i.e., from a junction box above the ceiling in a room to lighting and power outlets within the room.
- G. Minimum size conduit installed above grade for lighting, power, and signal wiring shall be 3/4" trade size.
- H. Minimum size conduit installed below grade for lighting, power, and signal wiring shall be 1" trade size, unless noted otherwise.
- I. Conduits installed underground shall have a minimum coverage of 24" below a finished grade. Provide a magnetically traceable warning tape at 12" below grade. Electrical systems rated greater than 150V to Ground shall have a 3" concrete envelope.

2.02 OUTLET AND SWITCH BOXES:

- A. Boxes shall be one piece die formed galvanized steel of shape and with fittings necessary to suit location and use. Boxes shall be of sufficient size to contain all wires, devices, and connection fittings required without crowding. Ceiling and surface mounted boxes shall be minimum 4" square or octagonal. Plaster rings shall be provided where required.
- B. Exposed boxes shall be cast type with gasketed weatherproof cover.
- C. Combined Emergency and Normal: All wall boxes with switches for both emergency and normal lights shall have a divider as required to separate normal and emergency circuits.

2.03 WIRING DEVICES:

- A. Wall Switches:
1. 120/277 Volt Switches: Quiet slow make, slow break design, toggle handle, with totally enclosed case, rated 20 ampere, specification grade. Provide matching two pole, 3 way, and 4 way switches.
 2. Acceptable types are:

	Hubbell
One pole	1221-I
Two-pole	1222-I
Three-Way	1223-I
 3. Color: Device color to match existing, verify exact device colors with Architect prior to purchase and installation. Switches on emergency power to be red.

B. Receptacles:

1. Standard Duplex Receptacles: Full gang size, polarized duplex, parallel blade, U-grounding slot, specification grade, rated at 20 amperes, 125 volts, designed for split feed service.

Hospital Grade Receptacles: Required for patient care areas, operating rooms, corridors, emergency power receptacles and where indicated as hospital grade.

Acceptable types are:

Type (Hubbell no.s):	Specification grade
Normal power	5362-I
Isolated Ground	IG 5362-I
Ground Fault	GF 5362-I

2. Nameplates: Provide engraved or embossed plastic for receptacles other than standard duplex receptacles, indicating voltage, phase and amperes.
3. Color; Normal Power Circuits: Device color to match existing. Verify colors of all devices with Architect prior to purchase and installation.

2.04 WALL PLATES:

- A. Scope: Provide plate for each wiring device and for each signal or communication outlet.
- B. Interior Flush: All locations unless noted otherwise; smooth stainless steel.
- C. Weatherproof Plates: Cast metal, gasketed; for receptacles, provide spring loaded gasketed doors. Provide at all weatherproof locations.
- D. Where two gang boxes are required for single gang devices, provide special plates with devices opening in one gang and second gang blank.
- E. Plates with Engraving: Provide black paint filled engraving for the following.
 1. Switch plates for all outlets not within sight of switch. Engrave with function and location of outlet.
 2. Lighting controls; engraved area identification of each switch where 3 or more switches are ganged together.
- F. Blank bushed or special outlet plates shall be provided for all signal and communications systems outlets as required.

2.05 WIRE:

A. Low Voltage - (Under 600 Volt):

1. Branch circuit wire shall be copper type THWN/THHN-2, 600 volt, from new fresh stock, bearing U.L. label, delivered to site in unbroken packages; minimum power size 12 AWG. All 20/1 home runs over 150 feet from panel shall be increased to next larger size. Conductors #8 or larger, shall be stranded copper, #10 AWG and smaller shall be solid copper or as shown on plans. All control wires shall be stranded.

PART 3 – EXECUTION

3.01 INSTALLATION OF CONDUIT RACEWAYS:

- A. General: Install conduits in a neat manner, concealed except as noted. Mount conduits directly to building structure with clamps or one hole straps where possible. Secure straps with cadmium plated wood screws into wood, and machine screws into metal or inserts preset in concrete. Where impractical to secure directly to structure, suspend on conduit hangers. Wherever possible, group and rack multiple conduit runs.
- B. Installation and Cleaning: Install free from dents, kinks and bruises. Red lead all threaded conduit joints before coupling. Plug ends at time of installation to prevent entry of dirt or moisture. Thoroughly clean out conduits before installing conductors. Thoroughly clean all exposed conduit exteriors.
- C. Provide tagged pullwire in all empty conduits. Pullwire shall be 1/8" stranded nylon, leave 36" free coiled each end.
- D. Protective Coating: All metallic conduits installed in contact with earth or in concrete on contact with earth shall be coated with a minimum 40 mil P.V.C. coating on all conduit lengths and fittings. The coating shall correspond to ATSM D638-68, D1706, D140-64, and D746-64T specifications and Federal test standard 141, method 615z. Coating shall be continuous without flaws showing exposed metal. Coating shall extend to the device conduit is terminated to in exposed locations and 12" above grade in unexposed locations.
- E. Conduits which stub-up through floor shall be installed so that none of the curved portions of the elbow is exposed. Conduit bends and risers terminating below-grade runs shall be 40 mil PVC coated galvanized rigid steel.
- F. Conduit Routing: Route exposed conduits parallel or perpendicular to walls or floors. Install conduits in masonry walls at time of wall construction. NO conduits will run under heavy equipment, footing or other structural elements. Where runs must cross footings, install in sleeves per structural details.
- G. Conduit Runs in Ceiling Areas: Conduits run above accessible ceiling shall be routed parallel or perpendicular to ceiling system and structural members. All conduit runs shall be coordinated to avoid conflicts with mechanical and structural systems, lighting fixtures and ceiling support system. Conduits shall be installed as close to the above structure as possible to avoid conflict with removal of ceiling panels.

- H. Conduits Penetrating Membranes: Where conduits penetrate wall or slab membrane moisture barriers, penetration shall be sealed in accordance with the requirements of applicable sections of these Specifications for "Thermal and Moisture Protection".
- I. Conduits Penetrating Roof: Provide flashing and counter flashing making watertight joints where conduits pass through roof or waterproofing membranes, in accordance with existing roofing manufacturer's warranty requirements.
- J. Escutcheons: Conduits penetrating wall, floors, or ceiling in exposed locations shall be installed with appropriate escutcheon plates.
- K. Separations: Coordinate with all other crafts to allow minimum of 12" running and 6 inches crossing clearance at flues, hot water pipes, steam pipes, and heat sources. Keep electrical conduits free from contact with all other piping runs of other systems or of dissimilar metals.
- L. Conduits Crossing Building Joints: Conduits shall not be run in concrete slab or wall construction where passing through an earthquake or expansion joint. At such condition, conduit shall be run exposed or in furred ceiling space with 24" length of flexible conduit crossing joints.
- M. Conduits Penetrating Floors and Walls: Provide grouting around raceways where penetrating floor slabs, concrete or masonry walls. At fire separation walls or floors, use Engineer approved expanding type putty, Nelson Flameseal or equal, to maintain the fire rating of the surface penetrated.
- N. Conduit Support: Support of conduit and tubing in steel stud walls shall be by #18 gauge steel wire, secured to steel bars or straps attached to steel studs. Conduits rising vertically between wall studs shall be tied to a horizontal cross support attached tightly to eliminate any movement.
- O. Conduit Hangers:
 - 1. Conduit hangers spaced at 8'-0" on center maximum with one hanger adjacent to each outlet box, shall be installed wherever conduit cannot be directly attached to structure. Hangers shall be secured to wood structures with steel brackets and wood screws, to steel structures with appropriate clamps, and to concrete structures with preset imbedded inserts or machine screws with expansion shields. Present inserts are preferred to provide a secure anchorage with greatest location flexibility. Power or velocity driven type attachments will not be allowed. Complete hanger installation shall provide a safety factor of 5 based upon maximum CEC allowed conduit fill.
 - 2. Hangers for rigid conduit and EMT 2" and smaller in concealed spaces shall be galvanized perforated type strap wrapped around raceway and bolted; then fastened to structure as described above.
 - 3. Trapeze type supports shall be used where conduits are run grouped together. such hangers shall consist of 3/8" minimum steel rods, structural steel channels, and clamps of Kindorf, Unistrut, or approved equal manufacture.

3.02 INSTALLATION OF JUNCTION BOXES AND INTERIOR PULL BOXES:

Locate pull boxes and junction boxes above removable ceilings or in electrical rooms, utility rooms, or storage areas. No junction box will be installed in an inaccessible area.

3.03 INSTALLATION OF OUTLET AND SWITCH BOXES:

- A. **Mounting:** Mount outlet boxes flush in areas other than mechanical rooms, electrical rooms, and above removable ceilings. Boxes shall be set true and flush with all necessary and correct adapters and/or plaster rings. All boxes set deeper than code allowable shall be corrected by use of factory made extension rings such as Raco #976 or equal.
- B. **Device Locations:** Locations of devices on plans are approximate only. Contractor shall study the architectural and structure plans and locate the outlets so that his work is coordinated with the work of others and the fixtures and devices present a pleasing and symmetrical appearance when installed. The location of outlets centered on any architectural feature shall be exact. Outlet locations may be moved a maximum of 10' from the location shown on the drawings before roughing-in without cost to Owner. Switches in relation to door swings and cabinets must be coordinated with architectural drawings. This Contractor shall coordinate with Mechanical Contractor and security and fire alarm Contractor regarding thermostat and security outlets and other equipment locations.
- C. **Device Height:** The following dimensions for locating wall outlets represent the distance from the finished floor to the center of the outlet, unless noted otherwise.

Device	Inches
Convenience receptacle	18 to center
Lighting switch	45 to center

Adjust outlet mounting height to agree with required location for equipment served.

- D. Boxes located in stud walls shall be mounted as follows:
1. Blocking material shall be installed behind all boxes with conduit entrances on one side only or on opposite sides. Outlet box shall be securely attached to both the adjacent stud and the blocking material. Blocking material shall be same as wall studs and shall be attached to two adjacent studs.
 2. Rear blocking may be omitted for boxes with conduit entrances on two adjacent sides if conduits are secured within 8" of box to adjacent wall stud or to a horizontal support between studs. Box shall be securely attached to adjacent stud. Support material shall be same as wall studs or a piece of tubing secured between studs.
- E. Boxes in counter-backs or casework shall be installed in accordance with architectural details. Where not indicated in elevations or details, the Architect shall be consulted

prior to installation.

- F. Boxes above accessible suspended ceilings shall be mounted to horizontal trapeze hangers, secured to rod attached to structure above, or attached to ceiling system suspension wire with "Caddy" clips. Conduit and boxes shall be located a minimum of 12" above ceiling where suspended depth permits. Conduit and boxes shall not be installed prior to ceiling unless system is attached or braced to structure as to prevent horizontal movement of conduit.
- G. Common Boxes and Alignment: Devices shown adjacent to each other at the same mounting shall be gang installed under a common plate, except for outlets of different voltages such as telephone and duplex receptacles. Outlets mounted one over the other, or side by side, shall be in exact alignment, centered on one another.
- H. Box Separation: Boxes and conduit shall be installed in a manner which minimizes sound transmission between rooms. Boxes mounted in a common wall shall be off-set horizontally a minimum of 12 inches and mounted in different stud spaces wherever possible. Boxes in fire rated construction shall be installed per CBC Chapter 43. No boxes shall be mounted back-to-back. No through boxes shall be used. Off-set boxes shall be connected with flexible conduit not to exceed 18" in length.
- I. Sealing: All unused holes or openings in boxes shall be slugged or sealed by an acceptable means.

3.04 INSTALLATION OF WIRING DEVICES:

- A. Devices shall be securely fastened to outlet box with face flush with plate.
- B. Mount receptacles vertically in appropriate boxes.

3.05 INSTALLATION OF WALL PLATES:

Install cover plates on wiring devices. Plates shall be set plumb and flush with finish wall surface. Plates located adjacent to one another shall be exactly the same height.

3.06 INSTALLATION OF FLOOR BOXES:

- A. Confirm exact placement with related work before installing. Install so that box will set flush with concrete floor.
- B. Securely anchor fitting to floor box. Install finish.

3.07 INSTALLATION OF WIRE:

- A. Scope: Provide all wiring for complete electrical work, installed in code conforming raceway. Branch circuit wiring shall be #12 AWG minimum, unless noted otherwise.
- B. Home Runs: Branch circuit conductors shall be home run to panelboards or motor control centers in groupings shown on the drawings. Combining branch circuit home run conductors in single conduits other than that shown shall not be permitted.

- C. Color coding shall be strictly adhered to and shall be as follows:
1. Color coding shall be:

120/240 Volt	277/480 Volt
A Phase – Black	A Phase – Brown
B Phase – Red	B Phase – Orange
C Phase – Blue	C Phase – Yellow
Neutral – White	Neutral – Grey
Ground – Green	
Travelers – Pink	
 2. Color coding utilized shall be noted on electrical "as constructed" drawings and shop drawings.
 3. The wires shall be of solid colors in size #6 and smaller. In sizes #4 and larger the wires shall be black and 3" width of the appropriate color tape shall be applied around the wire at 12" intervals starting 2" from the termination of the end of the wire.
 4. The color coding for control circuit wires will be as noted on the plans or as agreed upon with the Architect or Electrical Engineer and will be of a color other than that designated for the phase wires. Where control wires are installed and various colors are used, they shall be noted on the "as constructed" drawings and shop drawings turned in at the completion of the job.
- D. Pulling: Use approved wire pulling lubricant for pulling #4 AWG and larger wire. Oil or grease is prohibited as a conductor pulling lubricant. All conductors #8 and smaller shall only be pulled by hand. Pulling lubricant for conductors over 600 V will be approved by the conductor manufacturer and the Architect or Electrical Engineer.
- E. Splices: Join the conductors securely, both mechanically and electrically using crimp, compression, or pressure type connectors, except that screw-on type connectors shall not be used for wires larger than #10 AWG. The splice area shall be taped to provide equal or greater insulation than the original. Tape run-back over the original insulation shall extend 3 to 5 overall diameters of the insulated wire.
- No splices in conductors over 600 V or feeders over #6 AWG is permitted.
- F. Splice only in accessible junction or outlet boxes.
- G. Wiring in panelboards, switchboards, and cabinets shall be neatly installed. Wiring shall be grouped, laced or clipped, and fanned out to wiring terminals.
- H. Identification and Markings: In addition to all other requirements for identification and marking of wires, panelboards, and junction boxes, the following shall be strictly adhered to:
1. The identification of individual wires terminating in either junction boxes, circuit breakers, terminal strips, or on control devices shall be done by means of appropriate tape marker.

2. Where subdistribution wires terminate they shall be marked with the point of origination or point of destination, phase, and voltage to ground. This will include all subdistribution circuits originating from 480/277 volt or 240/120 volt distribution panels serving lighting circuits, receptacle circuits, small power equipment, and small mechanical equipment.
 3. Thus each end of a particular feeder or subdistribution class circuit shall be marked as to its phase and point of origination or destination and either voltage line to line in distribution class circuits or voltage to ground in subdistribution class circuits.
 4. All control circuits will be marked at each control panel as to their function and where they terminate.
Where control wires terminate into relays or enclosures or terminal cans remote from the main point of control, the wires will be marked as to their function and where they originate.
 5. All associated wiring integral within a control cabinet may be marked with the printed circular wire wrapping at each end.
 6. Where wires are pulled through or looped through a junction box, they shall be marked as to the point of origin and the point of destination. All markings in above ground junction boxes will be via linen tags with indelible ink and all markings on junction boxes or pull boxes below ground level will be by means of 1/4" plastic tape with embossed letters. This plastic tag will circle the wire and both ends stapled together.
- I. All junction boxes in attic spaces terminating or serving as gathering points for 208 volt circuits will have the cover painted blue.
 - J. Testing: All wires under 600 volt potential shall be tested with a 600 volt megohm prior to energization and the readings shall be recorded and handed in with the record drawings at the completion of the project. The tests shall be conducted from phase to phase and from each phase to ground.

3.08 INSTALLATION OF MECHANICAL AND OWNER'S EQUIPMENT WIRING:

- A. Furnish all power supplies for Mechanical Division equipment as shown on the mechanical plans.
- B. Make all connections of power to all mechanical and Owner's equipment along with installation of required disconnection means. This Contractor shall make all connections to other miscellaneous equipment which required line or low voltage power. Verify accessibility of all outlets and re-adjust outlets if necessary to meet the Code. Verify sizes and current characteristics of all equipment before installation of wiring and adjust wiring properly as required.
- C. Supply all electrical junction boxes for mechanical equipment.
- D. After all wiring to each unit is complete, Electrical Contractor shall cooperate with

Mechanical or Equipment Contractors in testing equipment for proper operation and shall correct wiring as required for proper operation.

END OF SECTION

SECTION 26 40 00 – LOW VOLTAGE ELECTRICAL TRANSMISSION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 - Specification sections, apply to work of this section.
- B. Section 26 05 00 - Basic Materials and Methods section and other Division 26 sections apply to work specified in this section.

1.02 SCOPE:

- A. Work included: Furnishing and installation of a complete electrical service, distribution, and grounding system. Conditions of this section apply to all other 26 40 00 series sections included.
- B. Related Work: Refer to other sections, particularly those listed below, so as to properly coordinate work specified herein with that specified elsewhere to produce a finished, workmanlike, fully functioning installation.
- C. All other Electrical Sections: Division 26

1.03 QUALITY ASSURANCE:

See Section 26 05 00.

1.04 SUBMITTAL:

- A. Product Data: Submit manufacturer's data on service entrance equipment, switchboards, motor control centers and/or individual starters, transformers, panelboards, disconnect switches and grounding components.
- B. Trip Curves: When requested, submit trip timing curves for all circuit interrupting devices.
- C. Nameplate Schedule: Submit nameplate schedule for approval.

1.05 COMPONENT COORDINATION:

In order to maintain close control and coordinate the various components of the distribution systems, the number of manufacturers shall be kept to a minimum. Equipment manufacturer shall be General Electric or Square D. It shall be the manufacturer's responsibility though the Electrical Contractor to coordinate all components of the system in order to ensure systems that will provide maximum protection of equipment and reliable safe operation.

1.06 NAMEPLATES:

Laminated phenolic plastic, color coded black for 120/208 volt equipment, with white letters.

Provide for identification of each transformer, panelboard and motor control center, secure to face with two (2) chrome plated screws each. A schedule of nameplates shall be included with the shop drawings for approval.

1.07 FEEDER CONNECTIONS:

Provide cast, saddle type bolted lugs or hydraulically set compression lugs for all bus connections. Manufacturer shall be Thomas and Betts, Burndy, O.Z. or approved equal. Lugs in which the set of screw embeds directly into feeder conductor shall not be used.

1.08 MISCELLANEOUS:

- A. Equipment Bases: Provide appropriately sized concrete housekeeping bases for all floor-mounted equipment.
- B. Hoisting Lifting Lugs: Provide on all heavy equipment as required to ensure safe hoisting.
- C. Space for Future Protective Device: Provide as indicated on drawings; shall be completely equipped for the future addition of a circuit breaker or fused switch, including all connections.

PART 2 – PRODUCTS

2.01 PANELBOARDS:

- A. Panelboards shall be Bolt-down Circuit Breaker type, with voltage, phase, and breakers as specified in panelboard schedules. Panelboards shall be installed flush or surface or specified, at locations as indicated on plans. Panelboards shall be installed in code gauge rust proof steel cabinets with flush door having flush locks all keyed alike and with trim cut square and true.
 - 1. Panelboards: General Electric A-Series and Spectra Series; Square D, type NQ, NQOB, and NF; or approved equal.
- B. All panelboards and breakers shall meet the requirements of the indicated available symmetrical short circuit current or have a minimum bus bracing to meet figure shown.
- C. All interiors shall be completely factory assembled. They shall be so designed that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors, so that circuits may be changed without machining, drilling or tapping.
- D. Branch circuits shall be arranged using double row construction except when narrow column panels are indicated. A nameplate shall be provided listing panel type and ratings.
- E. Unless otherwise noted, full size insulated neutral bars shall be included. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral bussing shall have a suitable lug or each outgoing feeder

requiring a neutral connection. A ground bus will be included in all panels.

- F. Boxes shall be at least 20 inches wide made from galvanized steel. Provided minimum gutter space in accordance with California Electric Code. Where feeder cables supplying the mains of a panel are carried through its box to supply other electrical equipment, the box shall be sized to include the additional required wiring space. At least four interior mounting studs with adjustable nuts shall be provided.
- G. Door hinges shall be concealed. All locks shall be flush, stainless steel, cylinder tumbler type locks with catches and spring loaded door pulls, keyed alike and directory frame and card having a transparent cover shall be furnished with each door.
- H. All exterior and interior steel surfaces of the trim shall be properly cleaned, primed with a rust inhibiting phosphatized coating and finish with a gray ANSI 61 paint. Trims for flush panels shall overlap the box for at least 3/4 inch all around. Surface trims shall have the same width and height as the box. Trims shall be mountable by a screwdriver without the need for special tools. After installation, trim clamps shall not be accessible when the panel door is closed and locked.
- I. All main bus bars shall be cooper or tin plated aluminum sized in accordance with UL standards to limit the temperature rise on any current carrying part to a maximum of 50 degrees C above an ambient of 40 degrees C maximum.
- J. Circuit breakers shall be quick-make, quick-break, thermal-magnetic, trip indicating, and have common trip on all multipole breakers. (Trip indication shall be clearly shown by the breaker handle taking position between ON and OFF when the breaker is tripped). Branch circuit breakers feeding convenience outlets shall have sensitive instantaneous trip settings of not more than 10 times the trip rating of the breaker to prevent repeated arcing shorts resulting from frayed appliance cords. Single pole 15 and 20 ampere circuit breakers shall be UL listed as "Switching Breakers" and carry the SWD marking. UL Class A (5 milliamperes sensitivity) ground fault circuit protection shall be provided on 120V ac branch circuits as specified on the plans or panel board schedule. This protection shall be an integral part of the branch circuit breaker which also provided overload and short circuit protection for branch circuit wiring. Tripping of a branch circuit breaker containing ground fault circuit interruption shall not disturb the feeder circuit to the panelboard. A single pole breaker containing ground fault circuit interruption shall not disturb the feeder circuit to the panelboard. A single pole circuit breaker with integral ground fault circuit interruption shall require no more panelboard branch circuit space than a conventional slide pole circuit breaker. Connections to the bus shall be bolt on.

2.04 DISCONNECTS:

- A. Motor and circuit disconnects shall have an Underwriters' Laboratory label.
- B. Disconnect switches shall be suitable for area where they are installed, i.e., weatherproof, and shall be rated heavy duty. Use only 600 volt class with proper number of poles. Switches shall be fused unless indicated on plans. Fuses shall be of type specified on plans.

- C. When a disconnect switch is not clearly visible from the control location, provide an operating handle which is lockable in the open position.

2.05 GROUNDING:

- A. Clamps, bonds, etc. suitable and as necessary to provide continuous ground system.
- B. Ground Rods: "Copperweld" 3/4" diameter 8' long.
- C. All grounding conductors shall be copper, sizes not less than that required under CEC Table 250.122.
- D. All grounding electrode conductors shall be copper, sizes not less than that required under CEC Table 260.66.

2.06 SWITCHBOARDS:

- A. Manufacturer's: Subject to compliance with requirements, provide switchboards of one of the following:

 - General Electric Company
 - Square D Company
- B. General: Except as otherwise indicated, provide switchboards of types, sizes, characteristics, and ratings indicated, which comply with manufacturer's standard design, materials, components, and construction in accordance with published product information, and as required for complete installation. Service entrance switchboards shall comply with serving utility requirements.
- C. AC Dead-Front Distribution Switchboards: Provide factory assembled, dead-front, metal enclosed, self-supporting secondary power switchboards, of types, sizes and electrical ratings and characteristics indicated; consisting of panel (vertical) units, and containing circuit breakers of quantities, ratings and types indicated. Provide copper or tin plated aluminum main bus and connections to switching devices of sufficient capacity to limit rated continuous operating temperature rise to 54 degrees F, and 90 degrees F for circuit breaker branches; with main bus and tap connections silver-surfaced and tightly bolted for maximum conductivity. Brace bus for short circuit stresses up to maximum interrupting capacity. Prime and paint switchboard with manufacturer's finish and color. Construct units for outdoor, NEMA Type 3R.
- D. Enclosures: Construct dead-front switchboards, suitable for floor mounting, with front cable/wire and conduit accessibility as indicated. Provide welded steel channel framework, hinge wireway front covers to permit ready access to branch circuit breaker load slide terminals. Coat enclosures with manufacturer's standard corrosive resistant finish.
- E. Bussing: Provide switchboard with sufficient cross-sectional area to fulfill U.L. Standard 891 pertaining to temperature rise.

2.06 MOTOR STARTERS:

- A. Manual motor starters to be quick-make, quick break, with overload protection. General Electric cr 101 for 120/240 volt 1 hp or less.
- B. Magnetic motor starters shall be across the line unless indicated with control power transformer (120 volt coil) and with overload relay protection. Combination type shall have integral fused switch or circuit breaker as indicated.

2.07 TRANSFORMERS:

- A. Transformers, Dry Type: Distribution transformers shall be constructed and tested in accordance with ASA and NEMA Standards, TP-1 minimum, and shall be wound with copper or aluminum conductors. Performance of transformers shall be equal to or exceed ASA and NEMA published criteria.
- B. Transformers shall be self-cooled type with Class H, NEMA, Group 111 insulation and a temperature rise of 150°C under continuous full load conditions with an ambient of 400°C.
- C. Transformers supplying voltage to wave altering devices (computers, electronic ballasts, etc.) shall be K3 rated minimum, or as noted otherwise on plans.
- D. Transformers shall be equipped with four 2 1/2% taps (2 taps above and 2 taps below normal voltage). Windings shall be of the fire-resistant type, designed for natural convection cooling through normal air circulation.
- E. Core mounting frames and enclosures shall be of welded and bolted construction with sufficient mechanical strength and rigidity to withstand shipping, erection and short circuit stresses.
- F. Enclosure cover plates shall be Code gauge sheet steel, captive bolted to the enclosure framework. Enclosure shall have suitable ventilating openings with rodent-proof screens. Enclosure shall be provided with lifting lugs and jacking plates as required.
- G. Transformers shall be furnished complete with mounting channels and mounting bolts. Metal parts, except cores and core mounting frames, shall be cleaned, rust-proofed and given a heavy coating of an inert primer.
- H. Transformers used indoors shall be "low noise." They shall be provided with vibration dampers. Size and number of shock mounts shall be in accordance with manufacturer's recommendations.
- I. Transformers shall be manufactured by General Electric, Square D, or approved equal.

PART 3 – EXECUTION

3.01 INSTALLATION OF SWITCHGEAR AND SWITCHBOARDS:

- A. Install switchgear and switchboards as indicated, in accordance with manufacturer's

written instruction, and with recognized industry practices to ensure that switchboards comply with requirements of NEMA and CEC standards, and applicable portions of NECA's "Standard of Installation".

- B. Prior to energization of circuitry, check all accessible connections to manufacturer's torque specifications. Subsequent to wire and cable hook-ups, energize switchboards and demonstrate functioning in accordance with requirements.

3.02 INSTALLATION OF PANELBOARDS:

- A. Provide mounting brackets, busbar drilling, and filler pieces for unused spaces.
- B. Branch circuits shall be connected as shown in line diagrams and/or panelboard schedules, with wires neatly tie wrapped in panel.
- C. All distribution panelboards shall have all sub feeders and main breakers marked with 1" x 3" plastic name tags secured with two self tapping screws.
- D. All panelboards shall be provided with a 2" x 3-1/2" plastic name tag on the front of the panel door or on the trim, indicating panel designation and distribution panel and circuit feeding above panel, secured with two self tapping screws.
- E. Branch circuit panelboards shall have a plastic covered circuit directory card on the inside of each door with all circuit destinations neatly typed.
- F. Contractor shall check and tighten all factory made wire or lug connections. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standard 486A.
- G. Install four (4) spare 3/4" conduits from all panelboards to accessible ceiling space.

3.03 INSTALLATION OF DISCONNECTS:

Install disconnects for all equipment and motors of the size required and as recommended by manufacturer.

3.04 INSTALLATION OF GROUNDING:

- A. Scope: Provide grounding system complying with the codes and ordinances specified. Grounding system shall provide continuity through the entire electrical system.
 - 1. Panelboard ground buses.
 - 2. PVC conduit or other raceways.
 - 3. All motors.
 - 4. All lighting fixtures.

5. Grounding terminals of all receptacles.
 6. Miscellaneous grounds required by code.
- B. Equipment and raceway bonding procedures shall be rigidly maintained and meet all jurisdictional requirements of codes and regulations.
 - C. Good, electrically continuous, metal to metal contacts shall be made wherever possible at all panel boxes, pull boxes, etc. Where it is not possible to obtain good contacts, the conduit shall be bonded round the boxes with a 6 BS gauge, rubber covered, double braided wire with ground clamps.
 - D. A separate grounding conductor shall be run in all conduit runs from distribution, lighting, and power, etc. panelboards, motor control outlets, etc., back to their respective service or distribution panelboards.
 - E. Flexible Conduit Grounding: Provide a separate grounding conductor in all flexible conduit runs to include watertight flexible conduit with integral grounding straps. Install ground conductors inside conduit with ungrounded conductors. Extend from nearest panel to device being connected.
 - F. Receptacle Circuits: Provide a separate grounding conductor in all receptacle circuit conduit runs, back to serving panelboard.

3.05 INSTALLATION OF MOTOR STARTERS:

- A. In finished areas, mount motor protection switches flush and install suitable cover plates.
- B. Install heaters correlated with full load current of motors provided.
- C. Set overload devices to suit motor provided.

3.06 INSTALLATION OF TRANSFORMERS

- A. Transformer core frame shall be installed level on shock absorbing pads within the enclosure.
- B. Mounting bolts on floor-mounted transformers shall be extended into pads only and shall not be in direct contact with building structural members.
- C. Flexible jumpers shall be installed for grounding continuity from enclosure to conduits.
- D. Voltage Check:
 1. The Contractor shall set the taps on all transformers (which are a part of this contract) as necessary to provide satisfactory operating voltages with all present loads energized. A check shall be made in the presence of the District Inspector at a panel fed from each transformer and which is the farthest from the transformer. Voltages at the transformers ranging from 118 to 122 volts inclusive, for 120-volt systems and proportionately equivalent for higher voltage

systems, are acceptable.

2. The Contractor shall provide all instruments and accessories required to perform the checks. Volt meters shall be accurate within 1% and shall have scales permitting the voltage readings to be made on the upper half of the scale.

END OF SECTION

SECTION 26 50 00 – LIGHTING FIXTURES**PART 1 – GENERAL****1.01 DESCRIPTION:**

- A. Work Included: Furnish and install lighting fixtures including lamps; connect fixtures to circuits, occupancy sensors, relays, room controllers, contactors, control panels, and gateways, where applicable.
- B. Related Work:
 - 1. Common Work Results for Electrical: Section 26 05 00.
 - 2. Low Voltage Electrical Transmission: Section 26 20 00.

1.02 SUBMITTALS:

- A. All submittals shall be made in accordance with Division 1 Submittal Procedures.
- B. List of Materials: Submit a complete list of material proposed for this Section.
- C. Shop Drawings for Lighting Fixtures: Provide detailed and dimensioned working drawings showing kind, weight and thickness of materials, method of fitting and fastening parts together, location and number of sockets, size and color of lamps, and complete details of the method of fitting, suspension and securing the fixtures in place. Drawings shall contain sufficient information to enable a workman to construct and install the fixtures without further instructions.
- D. Shop Drawings for Lighting Controls: Provide detailed and complete wiring diagrams and plans for lighting controls. Provide cut sheets for lighting control devices and cabling.

1.03 MOUNTING REQUIREMENTS:

Comply with State of California earthquake requirements and CEC requirements for lighting fixture installations and support.

1.04 GUARANTEE:

- A. Guarantee lighting components against service failure for five years. Indicate installation date on each driver by inscribing month, day and year on the housing.

PART 2 – PRODUCTS**2.01 MATERIAL AND FABRICATION:**

- A. Each lighting fixture shall be the type indicated on the drawings and as specified herein. Fixtures of the same type shall be of identical make, design and appearance. The size of each lighting fixture shall be as specified herein for the lamp or fixture wattage indicated on the drawings.

- B. The design of all lighting fixtures, accessories and supports, as well as the method of hanging fixtures, shall comply with all requirements for earthquake resistant construction of the State of California.

2.02 LIGHT FIXTURES:

- A. LED Drivers: Drivers shall be electronic type specifically designed to save energy while maintaining full light output. Drivers shall have "A" sound rating, thermal protectors and guaranteed against service failure for three years. Drivers shall comply with FCC and NEMA limits governing electromagnetic and Radio Frequency Interference and meet all applicable ANSI, State and Federal standards. The contractor shall indicate the installation date on each driver by inscribing the month, day and year on the ballast case. Drivers shall be noiseless, high power factor type and shall be ETL certified under CBM Standards and Underwriters' Laboratory listed.
- B. LED Diodes shall have the following minimum characteristics:
 - 1. Efficacy – 100 lumens per watt or greater
 - 2. Color rendition index – 80 or greater
 - 3. Standard deviation color matching for diodes shall fall within 1 MacAdam ellipse.

2.03 LIGHTING CONTROLS;

- A. Lighting controls and control systems shall meet all requirements of the State of California Title 24 energy code.
- B. Lighting control systems shall be commissioned by a factory lighting commissioner. Commissioning by the contractor is not acceptable.

PART 3 – EXECUTION

3.01 INSTALLATION:

- A. Install lighting fixtures where shown on plans.
- B. Fixture voltage shall be as shown on drawings and in the fixture schedule.
- C. Install recessed and surface-mounted fixtures with mounts or plaster frames compatible with the ceiling and wall systems employed and secure fixtures mechanically to frames.
- D. Align rows of surface-mounted fluorescent fixtures to form straight lines at uniform elevations. Provide factory joiner bands for contiguous fixtures, and end caps on ends.
- E. Recessed fixtures shall fit snugly against ceilings to prevent light leakage.
- F. Support suspended recessed fixtures in a T-bar ceiling as follows: All fixtures shall be attached to the ceiling grid to resist a horizontal force equal to the weight of the fixtures.

For heavy duty grid systems, fixtures weighing less than 56 pounds must also have two 12 gauge slack safety wires from diagonal corners to the structure above; fixtures weighing more than 56 pounds shall be independently supported by not less than 4 taut No. 12 gauge wires capable of supporting four times the load. For intermediate duty grid systems, fixtures shall be independently supported by not less than four taut No. 12 gauge wires capable of supporting four times the load. All fixture hanger wire ends shall be twisted three tight turns within a 2" distance. Fixture installation shall be coordinated with the acoustical ceiling installation.

G. Light Pole Installation:

1. Set in concrete footings; set poles plumb and straight. Grout and drypack after leveling poles. Concrete, grout and drypack are specified under Section 03 30 00, Cast-in-Place Concrete.
2. Electrically ground the fixtures and poles.
3. Solder and tape splices as required for the floodlight fixture installations.
4. Each standard shall be tapered galvanized steel, with handhole, anchor bolts, fixture mounting brackets and all accessories.
5. Poles shall be designed to withstand a minimum wind velocity of 101 mph sustained, 104 mph gusts.

H. Provide factory commissioning for lighting controls and devices. The completed installation shall comply in every way with the requirements of Title 24.

3.02 CLEANING:

- A. Clean surfaces of all dirt, cement, plaster and other debris. Use cleansers compatible with material surfaces being cleaned.
- B.
- C. Clean lenses, reflectors, and the like of dust, fingerprints, and grime.

3.03 TESTING:

- A. Check and adjust fixtures for even illumination.
- B. Replace defective fixtures and fixture components with new.
- C. The lighting control system shall be acceptance tested by an independent company. The agent shall not be an employee of or affiliated with the contractor. The contractor is responsible for passing the acceptance tests.

END OF SECTION

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SECTION 27 00 00 – COMMUNICATIONS GENERAL

PART 1 – GENERAL

1.01 RELATED SECTIONS:

- A. This specification section provides general conditions for all division 27 specifications. All contractors working with in the division 27 specification shall adhere to this specification and these related specifications:

Section 270528 Communication Infrastructure Systems
Section 271000 Structured Cabling System
Section 274040 Assistive Listening System
Section 277000 Intercom-Clock-PA System
Section 278000 Video Surveillance System

1.02 STATEMENT OF WORK:

- A. This document describes the requirements for the contractors, products and installation relating to furnishing and installing Structured Cabling and Communications Systems.
- B. Contractor will provide a bid including all labor, materials, tools, and equipment required for the complete installation of work called for on the Construction Drawings and described in this Document. It is the responsibility of the Contractor to provide all material necessary to provide a complete and operable system. If the contractor feels that the system described is incomplete, they must address this in writing to the Owner/Owner's Representative before providing a bid.
- C. All questions concerning non-specified product and services will be address to the Owner's Representative before Contactor provides a bid. Owner expects that by accepting the Contractor's bid proposal that the Contractor has provided a competent bid for a complete solution.
- D. Product specifications, general design considerations, and installation guidelines are provided in this document. Quantities of devices, typical installation details, and mounting details will be provided as an attachment to this document. The successful vendor shall meet or exceed all requirements for the systems described in this document.
- E. Contractors DO NOT remove Owner network equipment without written approval from the Owner.

1.03 EXISTING CABLING AND SYSTEMS EQUIPMENT:

- A. Demolition of cabling systems per CEC 2019
1. Remove all cabling defined for demolition per CEC 640.2, 640.6.C, 645.2, 645.5.F, 725.2, 725.25, 770.2, 770.25, 770.154.A, 800.2, 800.25, 800.154.A, 820.2, 820.25, 820.154, 830.2, 830.25,

2. The owner shall be given “first right of refusal” for all decommissioned equipment and removed cable.
 3. The owner may wish to keep, recycle or destroy these items. If the items are refused by the owner the contractor may keep, recycle or destroy these items.
 4. Owner will establish a location for all materials it wishes to keep, recycle or destroy.
- B. Contractor SHALL NOT demo any existing analog telephone cables or outlets, except where complete reconstruction occurs. The existing telephone cabling will remain intact and used by the district upon re-occupancy. Contractor shall repair any telephone cabling they damage during this project. Cut cables must be replaced end to end, no splice repairs will be allowed.
- C. Contractor SHALL NOT demo any existing intercom cables or outlets, except where complete reconstruction occurs. The existing intercom cabling will remain intact and used by the district upon re-occupancy. Contractor shall repair any intercom cabling they damage during this project. Cut cables must be replaced end to end, no splice repairs will be allowed.
- D. Contractor SHALL NOT demo any existing coaxial CATV cables or outlets, except where complete reconstruction occurs. The cabling will remain intact and used by the district upon re-occupancy. Contractor shall repair any cabling they damage during this project. Cut cables must be replaced end to end, no splice repairs will be allowed.
- E. Contractor SHALL NOT demo any existing CCTV cables, outlets, or cameras except where complete reconstruction occurs. The existing cabling will remain intact and used by the district upon re-occupancy. Contractor shall repair any cabling they damage during this project. Cut cables must be replaced end to end, no splice repairs will be allowed. Coordinate with Owner for the removal of any cameras in the way of the scope of work. Owner will remove existing cameras.
- F. Contractor to coordinate with the Owner for the scheduled removal of any existing network equipment, such as, but not limited to, wireless access points, access point mounting brackets, network switches, and network routers. All equipment is to removed by Owner and NOT the contractor. Owner will remove and re-install any network equipment unless specifically coordinated with Contractor.

1.04 REGULATORY REFERENCES:

- A. Contractor will comply will all Federal, State, Local Codes/Regulations and Industries Standards.
1. Federal:
 - California Electric Code(CEC) 2013 or latest approved Chapter 8: “Communications Systems” Article 250: “Grounding”
 - NFPA 70 - National Electric Code(NEC)
 - FCC - Part 15, Part 68
 - ADA – Americans with Disabilities Act

2. State of California:
 - CCR Part 2 - California Building Code.
 - CCR Part 3 - California Electrical Code
 - Occupational Safety and Health Act (OSHA).
 - Title 24, Building Standards, State of California.
 - Title 19, California Code of Regulations.
 - Title 8, Electrical Safety, State of California

3. ANSI Standards
 - ANSI C2-2001 National Electrical Safety Code.
 - ANSI C80.3 Specification for Zinc-coated Electrical Metallic Tubing.
 - ANSI/UL 797 Electrical Metallic Tubing.
 - ANSI/ICEA S-83-596-2001 - Fiber Optic Premises Distribution Cable Technical Requirements.

4. Industry Standards:
 - Telecommunications Industry Associations/Electronics Industry Association (TIA/EIA)
 - TIA/EIA-568.0-D Commercial Building Telecommunications Cabling Standard
 - TIA/EIA-568-1.D General Requirements
 - TIA/EIA-568-C.2 Balanced Twisted Pair Cabling Components Standard
 - TIA/EIA-568-3-D Optical Fiber Cabling Components Standard
 - TIA/EIA-569-A Commercial Building Standard for Telecom Pathways and Spaces
 - TIA/EIA-606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
 - TIA/EIA-607 Commercial Building Grounding/Bonding Requirements
 - TIA/EIA-758 Customer-Owned Outside Plant Telecommunications Cabling Standard
 - TIA/EIA-758-1 Addendum No. 1 to TIA/EIA-758, Customer-Owned Outside Plant Telecommunications Cabling Standard
 - National Electrical Manufacturer’s Association (NEMA)
 - Institute of Electrical and Electronic Engineers (IEEE)
 - 802.3 (Ethernet)
 - 802.3ab (Gigabit Ethernet over 4-pair Category 5e, 6 & 6A or higher) 802.3Z (Gigabit Ethernet over optical fiber)
 - 802.11ac (Wireless LAN Specifications)
 - Underwriters Laboratories Inc. (UL)
 - International Organization for Standardization/International Electromagnetic Commission (ISO/IEC) ISO 11801 Generic Cabling for Customer Premises
 - Building Industry Consulting Services International (BICSI) Telecommunications Distribution Methods Manual (TDMM 13th Edition or latest).
 - ASCII - American Standard Code for information Interchange
 - ASTM - American Society for Testing and Materials

B. If there is a conflict between applicable documents, then the more stringent requirement shall apply. All documents listed are believed to be the most current releases of the documents. The Contractor has the responsibility to determine and adhere to the most

recent release when developing the proposal for installation.

- C. This document does not replace any code, either partially or wholly. The contractor must be aware of and comply with all local codes that may impact this project.

1.05 SAFETY/CONTRACTOR QUALIFICATIONS/QUALITY ASSURANCE:

A. Safety and Indemnity

1. The Contractor shall be solely and completely responsible for conditions of the job site, including safety of persons and property during performance of work.
2. The Contractor shall ensure that all personnel working in or anywhere on the site shall be provided a hard hat, safety shoes, a face shield or safety goggles, etc. for their protection.
3. No act, service, drawing review or construction observance by the owner's representative or any other party employed by the campus is intended to include review or approval of adequacy of the Contractor's safety measures, in, on or near the construction site.

B. Contractor Qualifications

1. Each low voltage contractor/sub-contractor shall submit their qualifications to the district prior to award of contracts.
2. Contractor shall have been in business for no less than five (5) years and have installed of a minimum of 3 projects of similar size and scope.
3. A Manufacturer Certified Installer contractor, currently certified in the Owner's standard solutions, shall complete the System installation. The contractor shall have completed standards based product and installation training. A copy of the Contractor's Manufacturer Certified Installer certificate shall be submitted with their submittal.
4. Sub-Contractor Qualifications
 - All Contractors shall submit a list of at least three (3) projects of similar dollar volume completed within the past 24 months for reference purposes.
 - The Contractor shall compile detailed information relating to similar work completed, including corporate references sufficient to enable the Owner to evaluate and agree to the Contractors' responsibility, experience and capacity to perform the work.
 - Each Contractor to perform telecommunications work on this project shall possess a C-10 or C-7 (formerly C-61) Limited Specialty License for Telecommunications and must be certified for the installation, termination, splicing, and testing of copper cables, fiber optic cable, riser cable, and inside wiring. The appropriate contractor's license for underground construction and conduit installation is also required.
 - An on-site Contractor superintendent must be available at all times. Contact can be by person or telephone.

5. Contractors who do not meet the minimum specified requirements will not be accepted.

C. Quality Assurance

Contractors are required to comply with the following without exception:

1. The winning Contractor will assign this project to a competent Project Manager who has demonstrated their ability to supervise a telecommunications project of the same size and scope.
 - The contractor will make this person available to the Owner/Owner's Representative before the start of this project for an interview. This person must be deemed acceptable by the Owner and/or their Representative before work can begin.
 - Project Manager will be required to be available for scheduled on site project meetings at no additional cost to the Owner.
 - Project Manager will be required to be available to meet on site with the Owner/Owner's representative with a minimum of 24 hours' notice for non-emergency issues, and a minimum of 4 hours for emergency issues at no additional cost to the Owner.
2. All material and equipment to be installed on this project shall be "new". If the Owner/Owner's Representative discovers that "used" material or equipment has been installed on this project the Contractor will be required to replace said materials and/or equipment with "new" products at no additional cost to the Owner.
 - "New" - Materials and products manufactured within one (1) year prior to installation, and meet or exceed the latest published specifications of the manufacturer. Also these materials and equipment may not have been in use before installation on this project unless directed otherwise in the project documents.
3. Contractor must warranty all materials, equipment and labor for a minimum of one (1) year from the Owner's acceptance of the work.
 - Warranty will provide repair/replacement of all defective or improperly installed materials at no additional cost to the Owner (including Labor, drive time, shipping, taxes, etc.).
 - Contractor is required to keep in stock replacement parts for all items covered in this specification and provide a competent service technician to be on site to repair/replace defective items no later than 24hours after receiving trouble call.
 - Warranty will cover normal Business hours, 8am – 5pm, Monday thru Friday. All calls received on a Friday or the day before a holiday will be held until the following regular business day.
4. Contractor must submit for full manufacturer extended warranty upon completion of the project. Warranty certificate to be sent directly to Owner.

1.06 SUBMITTAL DOCUMENTATION:

- A. The successful contractor shall provide their submittal package in accordance with the Section 01 20 00 1.06 Submittal Schedule

- B. The successful contractor shall provide three (3) copies of their submittal package.
- C. The Submittal Package will include:
1. All documentation given will be in a Bond Cover or in a Three (3) Ring Binder.
 2. A coversheet on the Contractor's Company Letterhead including:
 - Contractor's Name
 - Contractor's License Number
 - The Project Name
 - The Specification Number and Description
 - The date documentation was submitted.
 3. A spreadsheet with a full material list of products and equipment included in the Contractor's bid price. Spreadsheet will provide:
 - Manufacture Name
 - Part Number
 - Description
 - Quantity to be installed for each part.
 4. A legible copy of the Manufacturer's Catalog Cut sheet for each part included in the Contractor's bid.
 - The Catalog Cut sheets shall be placed in the same order as shown on the spreadsheet.
 5. Copies of the Manufacturer's Certification for a minimum of the Project Forman and 50% of the installation crew.
 6. Sample of Labeling Scheme. Contractor will provide a sample for each identifier to be used on this project. Labels are to be approved by Owner prior to printing.
- D. LEED/CHIPS/HPSA (when applicable to project provide additional submittal information)
1. Recycled content, segregated by pre- and post-consumer percentages.
 2. Rapidly renewable material content.
 3. VOC content
 4. Distances from site to follow material process locations.
 - Raw material harvest, collection or extraction
 - Product or component fabrication
 - Final material manufacture, if different than component fabrication

1.07 EQUIVALENT PRODUCTS:

- A. Pre-Approved Equals:
1. All pre-approved products shall be listed in the relevant specification section.
- B. Contractors wishing to approve a system other than those specified in this document will

be required to perform the following:

- Provide System specifications and cut sheets for all system components for the proposed new system(s).
 - Provide an itemized comparison to each of the system functions as described in this specification. Include in that document how the proposed system compares to the specified system described in this document on a line by line basis, using one of the following three criteria: “exceeds”/”matches”/ “unequal”.
- C. All other products than those specifically address in the bid document that the Contractor is seeking approvals for must be received by the Owner’s Representative no later than 5 business days before the bid date. All Approved Equals will be published in addendum form prior to the bid date.
- D. Failure to received written approval for product installed that deviates from the products called for in this specification and/or on the project drawings will result in the contractor having to replace the unapproved materials and equipment with the originally specified products at no additional cost to the Owner.
- E. All proposed system documentation must be sent to the Owner’s Representative via one of the following; mail, fax or email. The Contractor will include the project name, their contact information, and the specification section number that the proposed system is comparable to.

1.08 ACCEPTANCE AND WARRANTIES:

A. Project Acceptance

1. The Owner and the Contractor shall accept the project as complete based on the following criteria:
 - Before executing any performance testing, the Contractor shall present a test plan to the Project Engineer for their approval.
 - The Contractor has completed all testing and delivered copies of all test results to the owner's representative.
 - All test results have been examined and approved by the Contractor and the Project Engineer.
 - Copies of all documentation required by this section have been delivered to the Project Engineer.
 - All punch list items are completed to the satisfaction of the Inspector-of- Record.
 - Manufacturer Warranty Certification Certificates are provided to the Owner.
2. Following completion and/or compliance with the requirements listed above, the Contractor shall issue a Notice of Completion confirming that the project is complete. A 45-day acceptance period shall begin immediately following the issuance of the Notice of Completion.
3. Minor failures shall be responded to at the Owner's discretion or within one business day.

B. Manufacturer Warranties

1. The installed 271000 structured wiring (as applicable for given cable media) system, including both inter-building and intra-building sub-systems, shall be warranted by a manufacturer for a 15-year period or greater. Lifetime warranty is the warranty period preferred by the Owner and will be given preference where applicable.
2. The warranty certified systems will be a complete system comprised of products from a single solution manufacturer, warranted to operate as a guaranteed system for the entire channel (cords, telecommunications outlet/connectors, cables, cross-connects, patch panels, etc.). The Solution Manufacturer shall administer a follow on program through the Vendor to provide support and service to the purchaser, and a single extended warranty point of contact. In the event that the certified system ceases to support the certified application(s), whether at the time of cutover, during normal use or when upgrading, the manufacturer and vendor shall commit to promptly implement corrective action.
3. The Contractor shall be responsible for correcting any problems and malfunctions that are warranty-related for the entire warranty period. In the event that a Contractor should not be in business at the time of an issue, the manufacturer shall be responsible for all corrections, if deemed the responsible party.
4. Copies of any extended material warranties shall be passed through to the Owner.
5. During the installation and up to the date of final acceptance, the Contractor shall protect all finished and unfinished work against damage and loss. In the event of such damage or loss, the Contractor shall replace or repair such work at no cost to the Owner or any other Trade Partnership working on the project.

END OF SECTION

270528 – COMMUNICATIONS INFRASTRUCTURE SYSTEM

PART 1 – GENERAL

1.01 STATEMENT OF WORK:

- A. This document describes the requirements for the contractors, products and installation relating to furnishing and installing Underground Ducts and Raceway systems. All systems described herein shall be governed by the Division 16000 specifications, should these two documents be in conflict the more stringent shall prevail.
- B. The locations of vaults and pull boxes on the drawings are approximate and reflect the best information available. The Contractor is responsible for locating all existing utilities within the areas to be excavated prior to excavation. Final location of all trenches, communications utility vaults, and pull boxes must be verified and signed off on by the Owner/Owner's Representative.
- C. The contractor shall furnish and install all work necessary to make compete systems, whether or not such details are mentioned in these specifications or shown on the drawings, but which are necessary in order to complete working systems, excepting those portions that are specifically mentioned therein or plainly marked on the accompanying drawings as being installed or supplied by others.

1.02 CONTRACTOR QUALIFICATIONS/QUALITY ASSURANCE:

- A. Safety and Indemnity
 - 1. Contractors will submit the necessary documentation to demonstrate their compliance with Section 270000 "1.5 A. Safety & Indemnity".
- B. Contractor Qualifications
 - 1. Contractors will submit the necessary documentation to demonstrate their compliance with Section 270000 "1.5 B. Contractor Qualification".
- C. Quality Assurance
 - 1. Contractor shall comply with all requirements as specified in Section 270000 "1.5 C. Quality Assurance".
- D. Warranty
 - 1. Contractor shall comply with all requirements as specified in Section 270000 "1.8. Acceptance & Warranties".

1.03 SUBMITTAL DOCUMENTATION:

- A. The successful contractor shall provide their submittal package in accordance with the Section 01 20 00 1.06 Submittal Schedule, and Section 270000 "1.6 Submittal Documentation".

1.04 EQUIVALENT PRODUCTS:

- A. All Products described and Part Numbers given in this Specification are those of Leviton, Berk-Tek, Superior Essex, and Cooper B-Line unless otherwise noted.
- B. Pre-Approved Equals:
1. Utility Vault Company, Christy Concrete, BES
 2. Hoffman, B-Line, Circle AW
 3. CARLON, Allied Tubing, MaxCell
 4. RANDL Inc , Thomas & Betts, Bridgeport, Appleton, Erico, Minerallac
 5. Wiremold, Hubbell
- C. Contractors wishing to approve a system other than those specified in this document shall do so in accordance with Section 270000 "1.7 Equivalent Products".

PART 2 – PRODUCTS

2.01 PATHWAYS & FITTINGS:

- A. Communication Underground Boxes
1. Communication Pull Boxes
 - Provide separate pre-cast concrete pull boxes, with lids labeled "communications" (for TV, telephone, data, security).
 - Type equal to "Christy N16, N30, N40, N44" steel reinforced solid concrete box, concrete lid & 12" extension box shall be used. See project drawings for locations & additional requirements.
 - Shall be constructed out of 3000 PSI steel reinforced concrete.
 - Install on 6" gravel pad and provide drain. See project details for more info.
 - Pull boxes in traffic areas and along roads shall be designed and installed for H20-44 loading.
 - Pull boxes shall be located and provided with grade rings as necessary to ensure that water is drained from conduits.
 - Pull boxes shall be installed to minimize surface drainage entry as follows:
 2. Pull boxes should not be located in paths or streets. If such location cannot be avoided, pull boxes should not be located in low spots or drainage channels.
 3. Pull boxes not located in paths or streets should be installed so that the top is approximately 2" above final grade.
 - All pull boxes shall be installed with a mow strip minimum of 6".
 - Non-slip lids shall be provided for pull boxes in sidewalk areas. Use concrete or fiberglass-no metal lids in sidewalks.
 - Quantity: Contractor will provide pull boxes and covers in the sizes and quantities as shown on the drawings.
 4. Communication Vaults
 - Provide separate pre-cast concrete vault, with lids labeled "communications"

- (for TV, telephone, data, intrusion alarm).
- Vaults shall be equipped with a cable racking on the long walls suitable to support large copper cables as called for on the design documents.
- Vaults shall include; Anchorage, Lifting Inserts and Racking Devices.
- All Vaults shall be equipped with traffic-rated lids with a locking mechanism. All lids shall have the identification marking of “Communications” permanently affixed to the cover.
- All pull boxes shall be installed with a mow strip minimum of 12”.
- Quantity: Contractor will provide vaults and covers in the sizes and quantities as shown on the drawings.
- Standard Vault size 24”x36”x36” equal to Old Castle 2436-STD
- Large Vault size 36”x60”x36” equal to Old Castle 3660-STD

5. Communication Vault Accessories

UNDERGROUND CABLE RACK HOOKS

Lite Duty Extension

- Formed from 3/16 inch steel
- Hot dipped galvanized per ASTM A123 / A153
- Smooth top surface to protect cables from damage
- Insulator 11A31 fits these hooks
- Part numbers Inwesco or equal

Catalog No.	Extension From Face of Rack
10A35	4
10A36	7-1/2
10A37	10
10A38	14
10A39	18

Heavy Duty Extension

- Formed from 10 ga. steel
- Hot dipped galvanized per ASTM A123 / A153
- Unique design locks hook into rack
- Part numbers Inwesco or equal

Catalog No.	Extension From Face of Rack (Inches)
10C38	14

J-Hook Cradle

- Curved design to cradle cable
- Available in fusion bonded epoxy coated steel
- Available in injection molded ABS plastic
- Steel used is 1/4 inch thick x 15/16 inch wide
- ABS plastic hooks are 1-3/8 inch wide
- ABS plastic hooks furnished with locking tab

- Part numbers Inwesco or equal

Catalog No.	Type	Diameter Of Curve (Inches)
10A60	Coated Steel	2-1/2
10B60	Plastic	2-1/2
10A61	Coated Steel	5
10B61	Plastic	5

6. Surface-Mounted Entrance Cabinets Type 1 & 12
 - The Contractor shall provide a minimum of a NEMA 1 type enclosure that meets the UL 50, File No. E27567: Type 1 NEMA/EEMAC Type 1 CSA, File No. LL42184: Type 1 IEC 60529, IP30 standards for indoor applications.
 - The Enclosure shall be constructed from 16 awg galvanized steel, with a drip shield top and seam free side, front and back.
 - The Enclosure shall have a “slip-on” removable front cover held in place with steel screws.
 - Enclose shall incorporate pre-punched knockouts for standard trade size conduits up to 1”.
 - The size of cabinets mounted on an outside wall to serve a smaller building shall be as indicated on the construction plans.
 - Quantity: Contractor will provide boxes in the sizes and quantities as shown on the drawings.
7. Surface-Mounted Entrance Cabinets Type 3R and 4X
 - The Contractor shall provide a minimum of a NEMA 3R type enclosure that meets the UL 50 for outdoor applications.
 - The Enclosure shall be constructed from 16 awg galvanized steel, with a drip shield top and seam free side, front and back.
 - The Enclosure shall have a “slip-on” removable front cover held in place with steel screws.
 - Enclose shall incorporate pre-punched knockouts for standard trade size conduits up to 1”.
 - The size of cabinets mounted on an outside wall to serve a smaller building shall be as indicated on the construction plans.
 - Quantity: Contractor will provide boxes in the sizes and quantities as shown on the drawings.

B. Metallic Pull Boxes and Terminal Cans

1. NEMA Type 1 – Screw Cover Cans
 - Used for indoor use only
 - NEMA/EEMAC Type 1, IEC 60529, IP30
 - UL 50, 50E Listed; Type 1; File No. E27525, cUL Listed per CSA C22.2 No 40; Type 1; File No. E27525
 - 16, 14 or 12 gauge steel or plated steel
 - ANSI 61 gray polyester powder paint finish inside and out.
 - Minimum size 6x6x4
 - Pre-Approved Sizes
 - Hoffman ASE6X6X4, ASE10X10X4, ASE12X12X4, ASE18X12X4,

- ASE18X18X4
 - Hoffman ASE6X6X6, ASE10X10X6, ASE12X12X6, ASE18X12X6, ASE18X18X6, ASE24X18X6, ASE24X24X6
 - Provide “NK” for No Knock-Outs as required.
 - Provide “AFE” Flush Covers as required.
 - Provide “AFDF” Flush Doors on all cans in user accessible areas IE; Data Closets, Electrical Rooms, Janitor Rooms, and Mechanical Rooms.
 - Provide “ACLFDF” Lock Kits for all cans in student areas.
2. NEMA 3R Terminal Cans
 - Used for outdoor use under-eave, breezeway or parapet
 - NEMA/EEMAC Type 3R, IEC 60529, IP32
 - UL 50, 50E Listed; Type 3R; File No. E27567, cUL Listed per CSA C22.2 No 94; Type 3R File No. E27567
 - 16 gauge galvanized steel
 - ANSI 61 gray polyester powder paint finish inside and out over galvanized steel.
 - Minimum size 12x12x6
 - Hoffman A12R126HCR, A18R186HCR, A20R208HCR, A30R308HCR
 3. NEMA 4 Terminal Cans
 - Used for outdoor use vertical or Horizontal under-eave, breezeway or parapet
 - 16 or 14 gauge steel (see table)
 - Seams continuously welded and ground smooth
 - Stainless steel door clamps on three sides of door
 - ANSI 61 gray polyester powder paint finish inside and out over galvanized steel.
 - Minimum size 16x16x6
 - Hoffman A16H16ALP, A20H20ALP, A24H24ALP, A36H24ALP
- C. Conduit
1. Rigid Steel Conduit
 - Rigid steel conduit shall comply with Underwriter's Laboratories UL-6 Specification, ANSI C80.1 and Federal specification WW-C-581E or latest revisions. Conduit shall be hot dip galvanized on the exterior, with zinc or enamel on the interior.
 - Couplings, locknuts, and all other fittings shall be galvanized or sheardized, waterproof and threaded type only. Rigid conduit shall terminate with two locknuts; one outside and one inside enclosures and specified bushings. No running threads or chase nipples shall be issued without approval.
 - Bushings shall be non-metallic for 1 inch and smaller and insulated metallic for conduits larger than 1 inch.
 - Galvanized rigid steel conduits (GRC) may be used in all locations.
 - For underground runs in direct contact with earth, conduit shall be wrapped in 10mil PVC tape or shall be factory PVC-over-GRS conduit.
 - Intermediate metallic conduit (IMC) may be used indoor and outdoor locations, not underground.
 2. Electrical Metallic Tubing (EMT)
 - EMT conduit shall comply with Underwriter's Laboratories UL 797, ANSI

- C80.3 and Federal Specification WW-C-563 or latest revision. EMT shall be galvanized or sheardized.
- Couplings and connectors for EMT shall be galvanized or cadmium plated and shall be of the compression type requiring the tightening of a nut on a gland ring. No die cast type shall be allowed. All connections shall have permanent insulated throats.
 - Electrical metallic conduit (EMT) may be used indoor and outdoor locations, not underground, not in areas subject to physical damage, not in concrete slabs, not in hazardous areas, not in masonry walls.
3. Schedule 40 PVC
- The minimum conduit trade size allowed for this project will 2". Contractor will increase to the next higher trade size if conduit fill ration will exceed 40%.
 - Conduit shall be Carlon or equal, rated for use with 90° C conductors, UL Listed or approved equal. Material shall comply to NEMA Specification TC-2 (Conduit), TC-3 (Fittings) and UL 651 (Conduit) and 514b (Fittings).
 - Conduit and fittings shall carry a UL label (Conduit - on each 10 foot length; Fittings - stamped or molded on each fitting).
 - Conduit and fittings shall be identified for type and manufacturer and shall be traceable to location of plant and date manufactured. The markings shall be legible and permanent.
 - The Conduit shall be made from polyvinyl chloride compound (recognized by UL) which includes inert modifiers to improve weatherability and heat distortion. Clean rework material, generated by the manufacturer's own conduit production, may be used by the same manufacturer, provided the end products meet the requirements of this specification.
 - The conduit and fittings shall be homogeneous plastic material free from visible cracks, holes or foreign inclusions. The conduit bore shall be smooth and free of blisters, nicks or other imperfections which could mar conductors or Cables.
 - Conduit, fittings and cement shall be produced by the same manufacturer to assure system integrity.
 - Testing and Acceptance Criteria: Conduit and fittings shall be tested in accordance with the testing requirements defined in NEMA TC-2, NEMA TC-3 and UL-651 and 514. The acceptance criteria shall be given in the same standards.
 - All conduit and fittings shall be solvent cemented in applications in accordance with instructions from the manufacturer.
 - Conduit Spacers
 - High impact spacers shall be used in all multi-conduit duct banks (five or more conduits). The spacers shall conform to NEMA TC-2, TC-6, TC-8, and ASTM F 512.
 - Spacers shall be installed and secured following the manufacturer's suggested guidelines, the BICSI CO-OSP Manual, or TIA/EIA 578, whichever is more stringent.
4. Pipe hangers for individual conduits shall be factory made, consisting of a pipe ring and threaded suspension rod. The pipe ring shall be malleable iron, split and hinged, or shall be interlocked with the suspension rod socket.
5. Pipe racks for a group of parallel conduits shall be galvanized structural steel

performed channels of length as required, suspended on threaded rods and secured thereto with nuts above and below the cross bar. All offsets shall be in the same plane and shall be parallel.

6. Factory made pipe straps shall be one-hole malleable iron or two-hole galvanized clamps.
7. Manufacturer: Appleton, Crouse-Hinds, B-Line, Unistrut, T&B, or an approved equivalent product.
8. Conduit Terminations and Plugs
 - All conduits entering a vault or pullbox shall be equipped with a bell-end securely attached to the structure.
 - All metal conduits shall be equipped with a bushing or end collar to protect cable during placement.
 - All unused conduits placed on this project or cleaned and modified by the Contractor shall be equipped with reusable rubber or plastic expansion seal plugs in all utility vaults/pull boxes and within all buildings.
9. Conduit Flexible Type
 - Flexible conduit “Steel Flex or Aluminum Flex” may only be used for attic j-box to device connection, where specified in the project drawings or with consent of the owner/consultant representative.
 - Liquidtight flexible conduit may only be used where specified in the project drawings or with consent of the owner/consultant representative.
 - GRC & IMC fittings shall be galvanized rigid steel threaded type. Provide insulated grounding bushings at all enclosures.
 - EMT fittings shall be die cast or steel set screw type for dry locations, die cast or steel compression type for wet locations. Provide insulated grounding bushings at all enclosures.
 - PVC fittings shall be schedule 40 or schedule 80, provide adapters at all enclosures and transitions to GRC, IMC or EMT conduits.
 - Flexible fittings shall be die cast or steel type.
 - Liquidtight fittings shall be steel compression type.
 - Provide insulated screw on bushings on all conduit connections.
 - Provide insulated push on bushings for all stubb-out conduits.
 - Quantity: Contractor will provide conduits in the sizes and quantities as shown on the drawings.
10. Textile Innerduct - MaxCell
 - Made from White Polyester and Nylon resin polymer
 - Standard Outdoor Textile Innerduct: Micro (33mm), 2-inch, 3-inch and 4-inch single or multi-cell polyester/nylon textile innerduct containing 1250lb polyester flat woven pull tape.
 - Detectable Outdoor Textile Innerduct: Micro (33mm), 2-inch, 3-inch and 4-inch single or multi-cell polyester/nylon textile innerduct containing 1250lb polyester flat woven pull tape, and a solid copper, polyvinyl color coated conductor (19AWG minimum) for tracing and rated for a minimum of 6 amps and 600 volts. Conductor shall be placed in the sidewall edge fold of the textile sleeve.
 - Indoor Textile Innerduct (Riser-listed): Micro (33mm), 2-inch, 3-inch and 4-

inch single or multi-cell nylon textile innerduct containing 1250lb polyester flat woven pull tape which meets UL2024A for flame propagation and smoke density values for general applications.

- Plenum-Listed Textile Innerduct: Micro (33mm), 2-inch and 3-inch single or multi-cell nylon textile innerduct containing 200lb nylon-resin flat woven pull tape which meets UL2024A for flame propagation and smoke density values for use in air handling spaces.
- Conduit Plugs: Compression-type conduit plugs with locking nuts for sealing and securing one or more textile innerducts within a 4-inch inside diameter conduit, e.g.: 4-inch plug with nine holes for cables in a 3 pack (9-cell) configuration
- Termination Bags: Inflation-type bags for sealing and securing around one or more textile innerducts and cables within 2-inch outside diameter or larger conduit.
- Pull Tape: measuring and pulling tape constructed of synthetic fiber, printed with accurate sequential footage marks. Color-coded.
- Duct Water Seal: products suitable for closing underground and entrance conduit openings where innerduct or cable is installed, to prevent entry of gases, liquids, or rodents into the structure.
- Approved Textile Innerduct #'s MXC4003, MXR4003 MXC3456, MXP3456, MXR3456 MXC2003, MXP2003, MXR2003 MXC2002, MXP2002, MXR2002

D. Duct Bank Locating Cable (Detectable Warning Tape)

1. Warning tape

- Warning Tape shall be a minimum of 3" wide, orange in color, 4 mils thick, and shall have an imprint as follows:
"Caution Telephone Cable Buried Below" or,
"Caution Fiber Optic Cable Buried Below"

E. Inter-duct

1. Plenum

- White or orange Kynar PVDF Resin, a fluoropolymer compound.
- Plenum rated flexible optical fiber/communication raceway.
- Provide wire management in a building for fiber optic and data and communications cabling.
- Recognized per NEC Articles, 770 and 800 for Plenum, Riser and General Purpose Raceway for optical fiber, and telecommunications cables.
- UL Listed
- Meets UL 910 standards for Plenum Optical Fiber/Communications raceways.
- Provide all fittings to form a complete integrated raceway system.
- Extrude raceway from precision extruded PVDF resin
- 1"-2"diameter raceway shall have a 1/4" wide 1250 lb. tensile pull tape preinstalled.
- Shall be available in 3/4" through 2" diameters.
- Footage shall be sequentially marked.
- Threaded Aluminum Coupling: Molded Aluminum fitting which connect two pieces of corrugated tubing equipped with threaded ends.
- Quick-Connect Couplings: Molded Part which allows two pieces of 1"

diameter corrugated tubing to be quickly snapped together. Available only in 1" diameter.

- Quick-Connect Threaded Male Adapters: Molded fitting which quickly snaps onto a 1" diameter piece of corrugated tubing to produce a threaded end. Available only in 1" diameter.
- Quick-Connect Male Snap-In Adapters: Molded fitting which snaps onto a 1" diameter piece of corrugated tubing to connect to an outlet or switch box. Available only in 1" diameter.
- Metallic Terminal Adapters: Molded metal part which allows a piece of corrugated tubing to connect to metallic conduit and metallic boxes.
- Spool Length: Varies, contractor shall field verify prior to ordering.
- Color: Orange
- Part #: Carlon
 $\frac{3}{4}$ " CE4X1-1000 1" CF4X1C-1000
 1-1/4" CG4X1C-900
 1-1/2" CH4X1C-1200
 2" CJ4X1C-1400

2. Riser

- Orange polyvinyl chloride (PVC)
- Riser rated Flexible Optical Fiber/Communication Raceway.
- Provides wire management for fiber optic and data and communications cabling in Riser applications and/or General Purpose applications within a building or for direct burial or concrete encasement.
- Recognized per NEC Articles, 770 and 800 for Plenum, Riser and General Purpose applications for optical fiber, and telecommunications cables.
- UL Listed
- Listed under UL 1666 - Standard for Riser Application for Optical Fiber Raceway.
- Provide all fittings to form a complete integrated raceway system.
- Fabricate Raceway from precision extruded PVC resin.
- Kevlar_ pull tape can be preinstalled in the 1" through 2" diameter.
- The footage shall be sequentially marked.
- Shall be available in $\frac{3}{4}$ " through 2" diameters.
- Threaded Aluminum Coupling: molded Aluminum fitting which connect two pieces of corrugated tubing equipped with threaded ends.
- Quick-Connect Couplings: Molded Part which allows two pieces of corrugated tubing to be quickly snapped together. Available only in $\frac{1}{2}$ "-1" diameter.
- Quick-Connect Threaded Male Adapters: Molded fitting which quickly snaps onto a piece of corrugated tubing to produce a threaded end. Available only in $\frac{1}{2}$ "-1" diameter.
- Quick-Connect Male Snap-In Adapters: Molded fitting which snaps onto a piece of corrugated tubing to connect to an outlet or switch box. Available only in $\frac{1}{2}$ "-1".
- Metallic Terminal Adapters: Molded metal part which allows a piece of corrugated tubing to connect to metallic conduit and metallic boxes.
- Schedule 40 Fittings: Molded fitting that is solvent cemented to the raceways. Schedule 40 fittings are commonly used with PVC Schedule 40 rigid conduit.
- Spool Length: Varies, contractor shall field verify prior to ordering.
- Color: Orange
- Part #: Carlon

¾" DE4X1-1000 1" DF4X1C-1000
 1-1/4" DG4X1C-900
 1-1/2" DH4X1C-1200
 2" DJ4X1C-700

3. General Purpose for use in Underground Conduit
 - Orange polyvinyl chloride (PVC)
 - General Purpose is nonmetallic flexible raceway for use in General Purpose applications only. It is UL Listed and available with tape pre- installed.
 - General Purpose raceway is listed to UL 2024 in accordance with the California Electrical Code per Articles 725, 770, 800 and 820 for General Purpose and other cabling optical fiber/telecommunication applications.
 - For use in General Purpose areas per Articles 725, 770, 800 and 820 of the CEC.
 - Available in sizes ¾" through 2"
 - Pull tape can be factory pre-installed in 1" through 2"
 - Outside Diameters meet IPS Dimensions
 - Footage sequentially marked
 - Spool Length: Varies, contractor shall field verify prior to ordering.
 - Color: Orange
 - Part #: Carlon
 - 1" BF4X1B-8000
 - 1-1/4" BG4X1B-5600
 - 1-1/2" BH4X1B-4500
 - 2" BJ4X1B-8000

F. Outlet Boxes

1. Outlet boxes (voice, data and audio visual)
 - All boxes shall be 5 in. Square x 2.875 in. Deep Metal Box with Cable Management minimum. As required provide 4-11/16" square by 2-1/8" deep.
 - Volume: 64 in³ (1050 cm³)
 - Side Knockouts: (1) 1" & (1) 1-1/4" each side
 - Listing: C ETL US; for use on Class 2 and Class 3 Remote-Control, Signaling and Power-Limited Circuits only.
 - Provide ****varied depth**** mud ring as required to allow no more than 1/8" gap between wall materials.
 - Any unused outlet or j-box shall be equipped with a blank cover.
 - Approved Outlet box shall be RANDL Inc. T-55 series
2. Outlet boxes (wall phone, microphone and other devices)
 - All boxes shall be 4-11/16" square by 2-1/8" deep minimum.
 - Provide ****varied depth**** mud ring as required to allow no more than 1/8" gap between wall materials.
 - Any unused outlet or j-box shall be equipped with a blank cover.
3. Junction boxes
 - All boxes shall be 4-11/16" square by 2-1/8" deep minimum.
 - Provide ****varied depth**** mud ring as required to allow no more than 1/8" gap between wall materials.
 - Any unused outlet or j-box shall be equipped with a blank cover.

4. Surface Mount boxes
 - base has rectangular KO to enable extension from existing single-gang flush wall box and 1/2" and 1" trade size concentric KOs.
 - Accepts NEMA Faceplates
 - one-gang - 4 3/4" H x 3" W x 2 3/4" D equal to Wiremold # 2344
 - two-gang - 4 3/4" H x 4 7/8" W x 2 3/4" D equal to Wiremold # 2344-2

G. Floor Boxes

1. Floor boxes provide the interface between power and communication cabling in an on-grade or above-grade concrete floor where power and communication services are required. Boxes shall provide flush or recessed device outlets that will not obstruct the floor area.
2. Provide floor boxes approved for use in concrete floor construction. Boxes shall be approved for above grade (stamped steel) and on grade (cast iron) applications. Floor boxes shall have been examined and tested by Underwriters Laboratories Inc. to meet UL514A and Canadian Standard C22.2 and shall bear the appropriate label. Floor boxes shall conform to the standard set in the California Electrical Code. Multi-compartment box shall have been evaluated by UL to meet the applicable U.S. and Canadian safety standards for scrub water exclusion when used on tile, terrazzo, wood, and carpet covered floors.
3. Boxes shall be available in one-, two-, or three-gang configurations or a single unit with four independent wiring compartments and available in stamped steel and cast iron versions. Boxes shall be rectangular in shape and available in deep and shallow versions. Boxes shall provide pre- and post-pour adjustments. Multiple gang boxes shall also provide a removable barrier between the individual compartments for greater capacity when required.
4. Multi-Compartment Boxes: Floor boxes shall be manufactured in stamped steel or cast-iron. Box shall be available in shallow version for stamped steel or cast- iron types and deep version for stamped steel type only. Box shall have four independent wiring compartments that allow up to 4 duplex receptacles and/or communications services.
 - Boxes shall permit a tunneling feature that will allow internal wiring to various compartments. The box shall provide various size conduit openings.
 - Boxes shall be fully adjustable, providing a maximum of 1-7/8 inch pre-pour adjustment, and a maximum of 3/4 inch post-pour adjustment.
 - Boxes shall provide a series of device mounting plates that will accept both duplex power devices, as well as plates that will accommodate connectivity outlets and modular inserts. Where indicated, provide connectivity outlets and modular inserts by Ortronics or approved equal.
 - Activation covers shall be die-cast aluminum. Cover finish shall be one of the following, as selected:
 - a. textured aluminum finish.
 - b. Powder coat finish, color shall be Black.
 - c. Powder coat finish, color shall be Brass,
 - Activation covers shall be available in flanged or flangeless versions as selected. Covers shall be available with options for tile or carpet inserts, blank covers, or covers with one or two 1 inch liquid tight openings for furniture feed

- applications as applicable.
- Pre-Approved Floor boxes shall be equal to Wiremold RFB-4 & RFB-9 series boxes.
- Contractor shall provide all required entrance fittings & adapter plates for scope of work depicted.

H. Surface mount raceway "SMR"

1. Non-metallic raceway is an enclosed pathway used for surface distribution of branch circuit electrical wiring, and cabling for voice, data, multi-media, low voltage, and optical fiber. Raceway is typically installed in existing building structures, or after construction is complete. A complete raceway system includes raceway, covers, mounting hardware, various fittings, and outlet boxes installed at specific locations. Specific codes and standards apply to electrical wires and telecommunications cables that are deployed within non-metallic raceway. Codes that are enforced by the local Authority Having Jurisdiction (AHJ) must be observed during construction.
 - Assembly and disassembly of raceway base, cover, and fittings shall require no special tools.
 - Installed fittings shall be designed to overlap the raceway junction to cover exposed or uneven edges.
 - Security caps shall provide enhanced tamper protection by installing over the assembled raceway in desired locations.
 - Raceway shall be designed to accept inline device boxes with either horizontal or vertical faceplate orientations.
 - Device boxes shall have a removable knockout portion to permit raceway entry and exit. Device boxes shall serve as an extension box by removing a single knockout.
 - Device boxes shall be available in standard NEMA single, double, and 3- gang versions. Device box color shall match raceway color.
 - Device boxes shall accommodate various faceplates that accept modular connector inserts or bezels for balanced twisted pair, fiber optic, coaxial, multi-media, and other low voltage cabling connectors.
 - Faceplates for device boxes shall accommodate pre-printed labels for proper electrical identification, or telecommunications port identification according to ANSI/TIA/EIA-606-A.
 - Faceplates shall be available in colors that match the device box and raceway.
 - Category rated communications jacks installed in surface box faceplates shall have provisions for snap-in icons for further identification.
2. 5400 Series
 - The raceway shall be a two-piece design with a base and snap-on covers. The raceway base shall accept both a single cover that spans the entire base or two individual TwinSnap™ covers. Total width shall be 5.25" [133mm] by 1.75" [44.5mm] deep with an approximate thickness of .095" [2.4mm]. The base and cover shall be available in 8' [2.4m] lengths. The raceway shall be available with two (5400TB) or three (5400TBD) wiring channels. **VERIFY WITH OWNER BEFORE USING ANY RACEWAY. IT IS ALWAYS PREFERRED TO HAVE CABLING CONCEALED IN THE WALLS.**
 - The 5400TB Series Base shall have two wiring channels separated by one integral barrier. Each channel must be large enough to accept standard power

and communication devices without restricting capacity of the adjacent channel. The 5400TBD Series Base shall have three wiring channels separated by two integral barriers forming 1/2, 1/4, and 1/4 compartments. One channel must be large enough to accept standard power and communication devices without restricting capacity of the other channels. The 5400C Series Cover shall span the entire width of the base concealing all of the wiring channels. The 5400TC Series Cover shall have flanges for snapping onto the base side walls and center barrier. The cover shall span one-half the width of the base, providing independent access to services.

- A complete line of full capacity corner elbows and tee fittings must be available to maintain a controlled 2" [51mm] cable bend radius which meets the specifications for Fiber Optic and UTP/STP cabling and exceeds the TIA / EIA 569-A requirements for communications pathways. They shall be manufactured of a rigid PVC compound. A full complement of fittings must be available including, but not limited to tees, entrance fittings, cover clips, and end caps. They shall be manufactured of a rigid PVC compound. The fittings shall have a matte texture, in ivory or white colors to match the base and cover. They shall overlap the cover and base to hide uneven cuts. All fittings shall be supplied with a base where applicable to eliminate mitering. A transition fitting shall be available to adapt to other Wiremold series raceways.
- Device brackets shall be available for mounting standard devices in-line or offset from the raceway. A device bracket shall provide up to three single-gang openings at one location. Faceplates shall be 5507 Series that match and fit flush in the device plate. They shall be manufactured of rigid PVC compound.
- The raceway manufacturer will provide a complete line of connectivity outlets and modular inserts for UTP, STP (150 ohm), fiber optic, coaxial and other cabling types with faceplates and bezels to facilitate mounting. A complete line of preprinted station and port identification labels, snap-in icon buttons, as well as write-on station identification labels shall be available.
- If raceway does not exist and plans show raceway to be installed, verify with owner BEFORE any installation occurs. The Owner prefers all cables to be inside the walls, whenever possible. Verify with Owner on location Contractor believes raceway is required.

I. Cable Tray Systems

Provide cable tray system to route power and communications cable distribution for utility needs. Cable tray system shall consist of cable tray and appropriate fittings for a complete installation.

1. Cable tray is to be utilized in locations only as covered in Article 392 of the California Electric Code, as adopted by the National Fire Protection Association and as approved by the American National Standards Institute.
2. Trays shall be constructed of 6063 T6 and T5 aluminum alloys and shall utilize center lines to indicate all areas where after field cutting of tray, new holes need to be drilled or screws inserted (Center Spine, Twin Spine, Ladder Style and Wall Mounted Trays).
3. Ladder Tray: Cable tray shall be constructed to form an open and accessible compartment to hold the necessary cables. The tray shall be constructed of two

components, (1) two longitudinal support rails (side rails) and (2) the rungs. The rail shall be a single aluminum extrusion with extending flanges that provide rung support. The rungs shall have 7/8 inch cable laying surface and be attached with sheet metal screws to the two side rails on 6 inch, 9 inch or 12 inch centers, creating a cable laying area between the rails.

4. Wall Mounted Cable Tray: Cable tray shall be constructed to form an open and accessible compartment to hold the necessary cables which also enables full viewing of the compartment. The tray shall be wall mounted allowing cable lay-in where applicable.
 - Trays shall be constructed with two components, (1) the main support which is the spine and (2) the rungs. The spine shall be a single aluminum extrusion designed with a lower cavity which has extending wings and provides rung support.
 - Rungs shall have a 1 inch cable laying surface, and be attached on 6 inch, 9 inch or 12 inch centers, and protrude from the spine only on one side. The end of the rungs shall be bent upward to the height of 3 inches, 4 inches or 6 inches as applicable forming a 90 degree angle. This creates a cable laying area between the spine and the vertical portion of the rung. The rung shall be designed with a center screw groove along its length to provide a direct connection for rung mounted accessories. The ends of all rungs shall be fitted with a plastic cap to prevent damage to the cable and injury to the installer.
 - For multi-tier wall mounted trays, the lower rungs shall be mounted through the entire vertical distance of the spine and project down, be bent outward, then up from one side only, forming a 'J' hook shape. These rungs shall be fixed in place with a sheet metal screw through the top of the spine which allows for replacement or expansion of the tray area.
 - Top and bottom rungs shall form two or three tiers of cable tray, one above the other, attached to one single support member or spine.
 - Tray shall not have side rails and shall offer an open view of the cables.
5. A full complement of fittings for the cable tray shall be available including, but not limited to, 45 and 90 degree flat, vertical inside and outside elbows, tee and cross fittings, couplings for joining sections of the tray, hangers, end blanks, field-installed dividers and all other components necessary to make the system perform as intended. The fittings and accessories shall be of a compatible material.
6. Ladder Rack Cable Runway
 - Stringers shall be fabricated from ASTM A513 Steel tubing.
 - Rungs shall be fabricated from 3/8"x1 1/2" steel channel welded
 - Rungs shall be spaced at 12.0" center to center
 - Ladder Rack shall have a powder coat finished.
 - Ladder Rack shall be individually boxed
 - Ladder rack shall be part of a total system that includes: manufacture bends, wall supports, joining hardware, etc.
 - Ladder Rack shall be grounding per the TIA/EIA 607-A.
 - Ladder Rack shall be UL listed- File number E60548
 - Color: Ladder Rack will be BLACK
 - Quantity: See Drawing for quantity and installation details.
 - Part#: Equal to Cooper B-Line Ladder Rack, PN# SB17U12BFB

7. Wire Basket Cable Runway
 - Wire mesh cable tray shall be manufactured from round carbon steel wires that are 5 mm and 6 mm in diameter. Wires shall be welded at intersections to form a 2" x 4" grid pattern. The tray shall be U-shaped with equal height sidewalls.
 - Individual tray sections shall be 10' long and 4", 6", 8", 12", 16", 18", 20", or 24" wide. Sidewalls shall be 4" high, as specified below.
 - Wire mesh cable tray shall be zinc electroplated after fabrication, galvanized before fabrication (pre-galvanized) or painted black with powder coat paint, as specified below.
 - Wire mesh cable tray that is 6" wide or wider shall be UL Classified for suitability as an equipment grounding conductor only. Pre-galvanized trays shall be UL Classified in the United States. Painted tray shall be UL Classified in the United States.
 - Ladder Rack shall be grounding per the TIA/EIA 607-A.
 - Color: Zinc Electroplate
 - Quantity: See Drawing for quantity and installation details.
 - Part#: Equal to Chatsworth Products OnTrac
 - Part Number 34821-504, 4" High x 4" Wide x 10' Long.
 - Part Number 34821-506, 4" High x 6" Wide x 10' Long.
 - Part Number 34821-508, 4" High x 8" Wide x 10' Long.
 - Part Number 34821-512, 4" High x 12" Wide x 10' Long.
 - Part Number 34821-516, 4" High x 16" Wide x 10' Long.
 - Part Number 34821-518, 4" High x 18" Wide x 10' Long.
 - Part Number 34821-520, 4" High x 20" Wide x 10' Long.
 - Part Number 34821-524, 4" High x 24" Wide x 10' Long.
 - Provide all installation hardware required for installation whether shown on the plans or not. Some of the supports may require design build application and shall be included by the contractor without notice.
 - OnTrac Standard Splice Kit
 - OnTrac Splice Bar
 - OnTrac Splice Washer & Bolt Kit
 - OnTrac Spring Splice Kit
 - OnTrac Clamp Washer
 - OnTrac Carriage Bolt Hardware Kit
 - OnTrac 90° Splice Bar Kit
 - OnTrac Rack-Mount Hook
 - OnTrac Pedestal Clamp Bracket
 - Split Bolt Grounding Clamp
 - OnTrac Cable Tray Divider
 - OnTrac Cover
 - OnTrac Cable Tray Bottom Insert
 - OnTrac Cable Tray Liner
 - OnTrac Tool-Less Radius Drop
 - OnTrac Large Radius Drop
 - OnTrac Vertical Radius Bracket
 - OnTrac Electrical Box Bracket
 - OnTrac Conduit Bracket
 - OnTrac Auxiliary Side Bracket
 - OnTrac Section Support Bracket
 - OnTrac Label Holder
 - OnTrac Cable Tray Cutting Tool

- Threaded Rod, 3/8-16
- Threaded Rod Coupling Kit, 3/8-16
- Threaded Rod I-Beam Clamp, 3/8-16
- Hex Nut, 3/8-16
- Split Lock Washer, 3/8"
- Washer, 3/8"
- Hex Lag Screw, 3/8-7 x 2" Long
- Hex Lag Screw, 1/4-10 x 2" Long
- Split Lock Washer, 1/4"
- Provide all support systems required for installation whether shown on the plans or not. Some of the supports may require design build application and shall be included by the contractor without notice.
 - OnTrac Wire Mesh Cable Tray System Supports
 - OnTrac Ceiling Center Support Bracket
 - OnTrac Ceiling Edge Hanger
 - OnTrac Ceiling Trapeze Support Bracket
 - OnTrac Wall/Ceiling C-Support Bracket
 - OnTrac Wall L-Support Bracket
 - OnTrac Wall Triangle Support Bracket
 - OnTrac Wall-Mount Angle
 - OnTrac Under Floor Support
 - OnTrac Under Floor C-Bracket
 - OnTrac Pedestal Clamp Bracket Kit

J. Cabling Support System

1. Telco Backboards
 - Backboards shall be 4' x 8' x .75" void free plywood (ACX Plywood with the "A" side turned out).
 - The plywood shall be painted with two coats of white fire retardant paint.
 - Cut full size sheet to required size for application type.
2. J-Hooks
 - Cable supports shall provide a bearing surface of sufficient width to comply with required bend radii of high-performance cables; cULus Listed.
 - Cable supports shall have flared edges to prevent damage while installing cables.
 - Cable support system shall provide fasteners that allow them to be mounted to wall, concrete, joist, tee-bar wire, treaded rod, beams and raised floor supports.
 - Fasteners shall have the ability to either be factory or jobsite assembled; rated for indoor use in non-corrosive environments; cULus Listed.
 - Fastener to with one non-continuous cable support, factory or jobsite assembled.
 - Color: NA
 - Quantity: Contractor will provide quantities of j-hooks and hanger accessories in the amount necessary to support all horizontal cabling every 14" – 28". The load per hook shall not exceed the Owner's 40% fill ratio. All hooks shall have a retainer clip installed as part of the hook. Verify with Owner as to what 40% fill is.
 - Part#: ERICO CAT425, Cooper B-Line BCH12, BCH21, BCH32, BCH64 and accessories.

3. In-ceiling support brackets
 - Above-ceiling cable termination locations shall be either wall-mounted or suspended from structure above the drop ceiling. Cables or terminations shall not rest on ceiling grid or equipment above ceiling grid.
 - For Wireless Access Points and other above-ceiling-mounted communications devices, cables shall land in an above-ceiling bracket which is affixed to dedicated cable support hardware.
 - Two category-rated jacks may be installed in each above-ceiling bracket. Each above-ceiling bracket will hold a 2-port Surface-Mount Box or 1-U MOS SMB for multimedia applications.
 - For wall-mounted device locations (above or below ceiling), devices needing to be mounted directly to a backbox will utilize the in-wall mounting bracket to secure the jack inside the backbox.
 - One category-rated jack can be installed in each in-wall backbox jack mounting bracket. For devices requiring (2) category-rated jacks, (2) in-wall brackets must be used.
 - Part #:
 - Leviton QuickPort In-Ceiling Bracket, rod/wire hanger, 49223-CBC
 - Leviton QuickPort In-Ceiling Bracket, accepts beam and screw mounts, 49223-CB0
 - Leviton QuickPort In-Wall Bracket, 49223-BA5 (pack of 5)

K. Mule Tape

1. Empty Conduits
 - New mule tape is to pulled in that has a minimum 1200 lb. tensile strength and secured on both ends.
2. Installed with Cables:
 - Pull rope shall be new 1/2" flat tape with a minimum 1200 lb. tensile strength.
 - Contractor is required to install mule tape into every conduit that they pull cabling in.

2.02 FIRE STOP SYSTEMS:

A. General

1. Sleeves shall be 2", 3" or 4" EMT or smaller. All cables penetrating walls must be sleeved.
2. Sleeves shall maintain a 40% conduit fill ratio.
3. Sleeves must be supported or attached at walls by apparatuses meant to do so. All sleeves shall be rigidly and properly supported.
4. Sleeves must extend past inaccessible areas.
5. Sleeves must be protected by a U.L. rated system at all firewalls designated on the construction drawings.
6. Fire stopping shall be a material, or combination of materials, to retain the integrity

of time-rated construction by maintaining an effective barrier against the spread of flame, smoke, and gases. It shall be used in specific locations as follows:

- Duct, cables, conduit, piping, and cable tray penetrations through floor slab and through time-rated partitions or fire walls.
- Openings between floor slab and curtain walls, including inside hollow curtain walls at the floor slab.
- Penetrations of vertical service shafts.
- Openings and penetrations in time-rated partitions of fire walls containing fire doors.
- Locations where specifically shown on the drawings or where specified in other sections of the Standards.

7. Fire stopping materials shall be asbestos free and capable of maintaining an effective barrier against flame, smoke, and gasses in compliance with requirements of ASTM E 814, and UL 1479. Only listed fire stopping material acceptable to State, County, and City codes shall be used.
8. The rating of the fire stops shall in no case be less than the rating of the time rated floor or wall assembly.
9. All Fire stopping Locations (FSL) shall be labeled within 12" of the fire stopping material on each side of the penetrated fire barrier. The format for the Fire stopping Location identifier shall display the Telecom Room floor number, the Fire stopping Location number, and the hour rating of the fire rating system (e.g. 1-FLS001 (2)). Each fire stopping location shall be identified with a fire stopping warning label. The label shall include the manufacturer of the product, the installer and company name, the UL number for the product, the rating of the material, the installation date, and the number and type of cables passing through the opening. The fire stopping warning label can include the fire stopping location identifier, eliminating the need for a separate label. Penetration modifications requiring the repair/re-installation of the fire stopping material require the addition of a new fire stopping warning label. No previous fire stopping warning labels shall be removed or obscured by new labels. In the event the penetration is completely cleaned of existing fire stopping material, and new material is installed, the previous label shall be removed or obscured completely.
10. Manufacturers; Specified Technologies Inc., 3M & Hilti
 - SSS - intumescent sealant
 - SSP - putty and putty pads
 - SSAMW - mineral wool
 - IC 15WB+ - intumescent sealant
 - CP 25WB+ - intumescent sealant
 - Fire Barrier Moldable Putty+ - putty and putty pads
 - FS-ONE - intumescent sealant
 - CP 618 - putty and putty pads.

B. Single Entry System

- The fire stop system is comprised of the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure.
- Fire stop systems comprise an effective block for fire, smoke, heat, vapor and

pressurized water stream.

- All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate fire stop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall use the proper fire stop equipment.
- Fire stop systems shall be UL Classified to ASTM E814 (UL 1479).
- Quantity: See Drawing for quantity and installation details.
- Part#: Equal to STI, PN# SSS100

C. Re-Enterable Fire Stop System

- The re-enterable fire stop system is comprised of the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure.
- No additional fire stopping material shall be required to obtain proper fire stopping.
- The system shall offer full fire resistance whether it is empty or 100% visually filled.
- The system shall be self-contained, and shall automatically adjust to differing cable loads.
- The system shall allow add, moves, and changes without additional materials.
- All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate re-enterable fire stop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall use the proper fire stop equipment.
- Fire stop systems shall be UL Classified to ASTM E814 (UL 1479).
- The system shall be gang-able using wall plates for additional capacity.
- Quantity: See Drawing for quantity and installation details.
- Part #: Equal to STI STI PN# EZDP33FWS STI PN# EZDP33WR

2.03 GROUNDING/BONDING SYSTEMS:

A. Grounding and Bonding Equipment

1. Telecommunications Main Grounding Busbar (TMGB)
 - Telecommunications Main Grounding Busbar (TMGB) shall be constructed of
 - .25" (6.4 mm) thick solid copper bar.
 - The buss bar shall be 4" (100 mm) high and 12" (300 mm) long and shall have 18 attachment points (two rows of 9 each) for two-hole grounding lugs.
 - The hole pattern for attaching grounding lugs shall meet the requirements of ANSI-J-STD – 607-A and shall accept 15 lugs with 5/8" (15.8 mm) hole centers and 3 lugs with 1" (25.4 mm) hole centers.
 - The busbar shall include wall-mount stand-off brackets, assembly screws and insulators creating a 4" (100 mm) standoff from the wall.
 - The busbar shall be UL Listed as grounding and bonding equipment.
 - Design Make shall be:
 - Chatsworth Products, Inc. (CPI),
 - Telecommunications Main Grounding Busbar: Part Number 40153-012, 12" x 4" (300 mm x 100 mm) Telecommunications Main Grounding Busbar, UL Listed.

2. Telecommunications Grounding Busbar (TGB)
 - Telecommunications Grounding Busbar (TGB) shall be constructed of .25" (6.4 mm) thick solid copper bar.
 - The busbar shall be 2" (50 mm) high and 10" (250 mm) long and shall have 7 attachment points (one row) for two-hole grounding lugs.
 - The hole pattern for attaching grounding lugs shall meet the requirements of ANSI-J-STD – 607-A and shall accept 4 lugs with 5/8" (15.8 mm) hole centers and 3 lugs with 1" (25.4 mm) hole centers.
 - The busbar shall include wall-mount stand-off brackets, assembly screws and insulators creating a 4" (100 mm) standoff from the wall.
 - The busbar shall be UL Listed as grounding and bonding equipment.
 - Design Make shall be:
 - Chatsworth Products, Inc. (CPI),
 - Telecommunications Grounding Busbar:
 - Part Number 13622-010, 10" x 2" (250 mm x 50 mm) Telecommunications Grounding Busbar, UL Listed.

3. Horizontal Rack Busbar
 - Horizontal rack-mount busbar shall be constructed of 3/16" (4.7 mm) thick by 3/4" (19.1 mm) high hard-drawn electrolytic tough pitch 110 alloy copper bar.
 - Bar shall be 19" EIA or 23" rack mounting width (as specified below) for mounting on relay racks or in cabinets.
 - Bar shall have eight 6-32 tapped ground mounting holes on 1" (25.4 mm) intervals and four 0.281" (7.1 mm) holes for the attachment of two-hole grounding lugs.
 - Each bar shall include a copper splice bar of the same material (to transition between adjoining racks) and two each 12-24 x 3/4" copper-plated steel screws and flat washers for attachment to the rack or cabinet.
 - Bar shall be UL Listed as grounding and bonding equipment.
 - Design Make shall be:
 - Chatsworth Products, Inc. (CPI),
 - Horizontal Rack Busbar: Part Number 10610-019, Ground Bar for 19" Rack.

4. Two Mounting Hole Ground Terminal Block
 - Ground terminal block shall be made of electroplated tin aluminum extrusion.
 - Ground terminal block shall accept conductors ranging from #14 AWG through 2/0.
 - The conductors shall be held in place by two stainless steel set screws.
 - Ground terminal block shall have two 1/4" (6.4 mm) holes spaced on 5/8" (15.8 mm) centers to allow secure two-bolt attachment to the rack or cabinet.
 - Ground terminal block shall be UL Listed as a wire connector.
 - Design Make shall be:
 - Chatsworth Products, Inc. (CPI),
 - Two Mounting Hole Ground Terminal Block:
 - Part Number 40167-001, Two Mounting Hole Ground Terminal Block, 1 each
 - Compression Lugs
 - Compression lugs shall be manufactured from electroplated tinned copper.
 - Compression lugs shall have two holes spaced on 5/8" (15.8 mm) or 1" (25.4 mm) centers, as stated below, to allow secure two bolt connections to busbars.
 - Compression lugs shall be sized to fit a specific size conductor, sizes #6 to 4/0, as stated below.

- Compression lugs shall be UL Listed as wire connectors.
 - Design Make shall be:
 - Chatsworth Products, Inc. (CPI),
 - Compression Lugs:
 - Part Number 40162-901, Compression Lug, #6 Awg, 5/8" (15.8 mm) hole spacing, 1 each.
 - Part Number 40162-903, Compression Lug, #6 Awg, 1" (25.4 mm) hole spacing, 1 each.
 - Part Number 40162-904, Compression Lug, #2 Awg, 5/8" (15.8 mm) hole spacing, 1 each.
 - Part Number 40162-907, Compression Lug, #2 Awg, 1" (25.4 mm) hole spacing, 1 each.
 - Part Number 40162-909, Compression Lug, 2/0 Awg, 1" (25.4 mm) hole spacing, 1 each.
 - Part Number 40162-911, Compression Lug, 4/0 Awg, 1" (25.4 mm) hole spacing, 1 each.
5. Antioxidant Joint Compound
- Oxide inhibiting joint compound for copper-to-copper, aluminum-to-aluminum or aluminum-to-copper connections.
 - Design Make shall be:
 - Chatsworth Products, Inc. (CPI),
 - Antioxidant Joint Compound:
 - Part Number 40168-101, Antioxidant Joint Compound, Copper-to-Copper Connections, .5 oz, 1 each.
 - Part Number 40168-801, Antioxidant Joint Compound, Copper-to-Copper Connections, 8 oz, 1 each.
 - Part Number 40166-101, Antioxidant Joint Compound, Aluminum-to-Aluminum or Aluminum-to-Copper Connections, .5 oz, 1 each.
 - Part Number 40166-801, Antioxidant Joint Compound, Aluminum-to-Aluminum or Aluminum-to-Copper Connections, 8 oz, 1 each.
 - Part Number 40168-150, Antioxidant Joint Compound, Copper-to-Copper Connections, .5 oz, 50 each.
 - Part Number 40168-812, Antioxidant Joint Compound, Copper-to-Copper Connections, 8 oz, 12 each.
 - Part Number 40166-150, Antioxidant Joint Compound, Aluminum-to-Aluminum or Aluminum-to-Copper Connections, .5 oz, 50 each.
 - Part Number 40166-812, Antioxidant Joint Compound, Aluminum-to-Aluminum or Aluminum-to-Copper Connections, 8 oz, 12 each.
6. C-Type, Compression Taps
- Compression taps shall be manufactured from copper alloy.
 - Compression taps shall be C-shaped connectors that wrap around two conductors forming an irreversible splice around the conductors; installation requires a hydraulic crimping tool
 - Compression taps shall be sized to fit specific size conductors, sizes #2 AWG to 4/0, as stated below.
 - Compression taps shall be UL Listed.
 - Design Make shall be:
 - Chatsworth Products, Inc. (CPI),
 - Compression Taps:

- Part Number 40163-001, Compression Tap, #6 AWG Solid Run to #6 AWG Solid Tap, 1 each.
 - Part Number 40163-007, Compression Tap, 2/0 Stranded Run to 2/0 Stranded Tap, 1 each.
7. Pipe Clamp With Grounding Connector
- Pipe clamp shall be made from electroplated tinned bronze. Installation hardware will be stainless steel.
 - Pipe clamp shall be sized to fit up to two conductors ranging in size from #6 to 250 MCM; conductors must be the same size.
 - Pipe clamp installation hardware shall be sized to attach to pipes, sizes 1" to 6" (.75" to 6.63" in diameter), as stated below.
 - Pipe clamp shall be UL Listed as grounding and bonding equipment.
 - Design Make shall be:
 - Chatsworth Products, Inc. (CPI),
 - Pipe Clamps:
 - Part Number 40170-002, Pipe Clamp, for 1" to 1-1/4" pipe, 1 each.
 - Part Number 40170-003, Pipe Clamp, for 1-1/2" to 2" pipe, 1 each.
 - Part Number 40170-004, Pipe Clamp, for 2-1/2" to 3" pipe, 1 each.
 - Part Number 40170-005, Pipe Clamp, for 3-1/2" to 4" pipe, 1 each.
 - Part Number 40170-006, Pipe Clamp, for 5" to 6" pipe, 1 each.
8. Equipment Ground Jumper Kit
- Kit includes one 24"L insulated ground jumper with a straight two hole compression lug on one end and an L-shaped two hole compression lug on the other end, two plated installation screws, an abrasive pad and a .5 once tube of antioxidant joint compound.
 - Ground conductor is an insulated green/yellow stripe #6 AWG wire
 - Lugs are made from electroplated tinned copper and have two mounting holes spaces .5" to .625" apart that accept 1/4" screws.
 - Jumper will be made with UL Listed components
 - Design Make shall be:
 - Chatsworth Products, Inc. (CPI),
 - Equipment Ground Jumper Kit:
 - Part Number 40159-010, Equipment Ground Jumper Kit, 1 each.

B. Communications raceways, backboards and rack systems

1. The conduit system must be permanently and effectively grounded, in accordance with Title 24 of the California Code of Regulations, California Electric Code #250, and National Electric Code or as required by local AHJ. If in confusion or conflict the most stringent specification shall apply.
2. Provide as a minimum a #1/0awg THHN conductor in conduit from the main building grounding point to a 1/4" x 4" x 5.25" telecommunications grounding bus bar(TGB) at every backboard.
3. Provide as a minimum #6awg green THHN conductor from each equipment rack, cable tray or wall mounted equipment to a TGB.

PART 3 – EXECUTION

3.1 GENERAL:

A. Permits and Licensing

1. Contractor is responsible to procure all necessary permits before the commencement of their work to the city or state agencies as required. It is the contractor's responsibility to provide all documentation to the AHJ.
2. Contractor is responsible to procure all necessary licenses for the city or state they are commencing the work in, before the commencement of their work begins.
3. Contractor to procure all encroachment permits as it pertains to the work described in these documents.
4. No person may access or enter in any way, an underground vault or confined space without the training, staff, and safety equipment defined on the confined space permit. Accessing these spaces without a valid permit or without the required support services will be cause for an order to stop work until all violations are resolved and may result in a fine or suspension of the workers involved.

B. Safety

1. All federal (OSHA), state, and local safety rules, will be enforced at all times during the duration of the project. It is the responsibility of the Contractor to conduct frequent inspections of the job site to ensure compliance.

3.2 INSTALLATION:

A. INTRA-BUILDING PATHWAYS

1. COMMUNICATION VAULTS

a. Site Access

- The general contractor shall be responsible for providing adequate access to the site to facilitate hauling, storage and proper handling of the precast concrete units.

b. Installation

- Precast concrete units shall be installed to the lines and grades shown in the contract documents or otherwise specified.
- Precast concrete units shall be lifted by suitable lifting devices at points provided by the precast concrete producer.
- Precast concrete units shall be installed in accordance with applicable industry standards. Upon request, the precast concrete producer shall provide installation instructions.
- Field modifications to the product shall relieve the precast producer of liability regardless if such modifications result in the failure of the precast concrete unit.

c. Watertightness

- Where watertightness is a necessary performance characteristic of the

precast concrete unit's end use, watertight joints, pipe-entry connectors and inserts should be used to ensure the integrity of the entire system.

2. CONDUIT

- All conduit shall be routed parallel or perpendicular to walls.
- All conduit shall be installed in accordance with NEMA "Standard of Installation" and shall meet applicable local and California building and electrical codes or regulations.
- Conduit runs shall not exceed 100 feet or contain more than two 90 degree bends without utilizing appropriately sized pull boxes. No conduits may enter a pull box at a 90 degree angle. They are not to be installed into the side of a pull box. All conduits must enter the ends of the pull box.
- All conduits entering a building from outside shall be plugged with reusable stoppers to eliminate the entrance of water or gases into the entrance room. Building entrance conduits shall slope downward away from the building to reduce the potential of water entering the building. All building penetrations are to be sealed from wall to wall and on the outside and inside of the penetrations.
- All conduits penetrating a fire or smoke barrier shall be fully sealed between the conduit and the actual penetration following manufacturer's recommendations. Contractor shall label each fire stop location with the manufacturer's identification number of the product used and shall provide the inspector copies of each products system configuration.
- No communications outlet boxes shall be "daisy-chained." Each communications outlet shall be served by a separate 1-inch (minimum) conduit.
- In rooms with a drop or false ceiling, communications outlets shall be served by a 1-inch conduit stubbed six inches above the false ceiling, angled toward the cable tray or open access area, and be equipped with a compression fitting and plastic bushing. All stubs shall be marked "Comm".
- All conduit shall be equipped with an approved water or barrier seal in building access points.
- All conduits which utilize fabric mesh innerduct, will have the innerduct installed first, and then the appropriate cables installed within the channels of the innerduct.
- No communications conduit shall contain more than 180 degrees of bend without the use of a pullbox. Pullboxes must be approved by Engineer of Record to ensure proper sizing and conduit entry placement.
- In areas where hard lid ceilings are in place, all conduits are to run to accessible location or to cable tray.
- Provide labels at both ends of conduits to identify location of far end.

3. STATION CABLE SUPPORT SYSTEM

- All station cable support systems shall be braced for zone four seismic activity.
- In suspended ceiling and raised floor areas where duct, cable trays, or conduit are not available, station cables shall be bundled with Velcro straps at appropriate distances.
- Velcro straps shall not be over tightened to the point of deforming or crimping the cable sheath.
- Velcro straps shall be UL listed, rated for low smoke, and certified for use in

- a plenum environment.
 - The station cable support system components shall be firmly attached to the existing building structure and installed not more than five feet apart.
 - The station cable support system components shall be installed to provide at least three (3) inches of clear vertical space between the cables/optics and the ceiling tiles.
 - The station cable support system components shall be spaced to prevent the cables/optics from sagging or buckling.
 - No more than eighteen (18) Category 6 cables shall be supported by a J - hook.
 - No more than thirty (30) Category 6 cables shall be supported by triangular galvanized metal bracket.
 - The station cable support system shall be clearly and neatly labeled per TIA/EIA 606-A, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
4. Raceways
- All dual channel raceway shall be installed with a complete end-to-end channel for future power service installation.
 - The raceway shall be stubbed above the false ceiling space and capped so that each section of raceway can be connected to a power service in the future without a requirement to add raceway to visible portions of the system. If no false ceiling space is available, the power channel is to be stubbed up and capped next to the point at which the communication services enter the room.
5. Cable Tray
- The Contractor will be responsible for placement of the cable tray in concert with other trades, allowing sufficient room for the cable installers to gain access to all portions of the tray system. Cable tray location shall be coordinated with open ceiling areas, access panel locations, and feeder conduit positions to provide an accessible cable pathway throughout the facility.
 - All metallic trays must be grounded and may be used as a ground conductor. Provide #2 AWG bare copper equipment grounding conductor through entire length of tray; bond to each component. Trays used as an equipment grounding conductor must be clearly marked.
 - Trays shall be bonded end-to-end.
 - Trays shall enter distribution rooms a minimum of six inches into the room, then utilize a drop out to protect station cables from potential damage from the end of the tray.
 - Cable trays shall be placed a minimum of six (6) inches from any overhead light fixture and twelve (12) inches from any electrical ballast. A minimum of eight (8) inches of clearance above the tray shall be maintained at all times. All bends and T-joints in the tray shall be fully accessible from above (within 1 foot). Trays shall be mounted no higher than twelve (12) feet above the finished floor and shall not extend more than eight (8) feet over a fixed ceiling area.
 - A separate conduit sleeve (minimum of four inches) must be provided as a pathway through any wall or over any obstruction (such as a rated hallway) from the cable tray into any room having a communications outlet.

- The Contractor shall fire stop around the tray and, after installation of the cables, within the tray using removable pillow-style products following manufacturers' guidelines. Sound deadening material shall be provided and installed after installation of cable.
 - In rooms without a drop ceiling (open to the structure), the cable shall be mounted as high as possible to provide the greatest clearance above the finished floor, but within the limits in (e) above.
6. Wire Mesh Cable Tray
- Provide all components of the tray system (tray, supports, splices, fasteners, and accessories) from a single manufacturer.
 - Wire mesh cable tray shall be secured to the structural ceiling, building truss system, wall or floor using manufacturer's recommended supports and appropriate hardware as defined by local code or the authority having jurisdiction (AHJ).
 - When the pathway is overhead, wire mesh cable tray shall be installed with a minimum clearance of 12" (300 mm) above the tray. Leave 12" (300 mm) in between the tray and ceiling/building truss structure. Multiple tiers of wire mesh cable tray shall be installed with a minimum clearance of 12" (300 mm) in between the trays. When located above an acoustical drop ceiling, wire mesh cable tray shall be installed a minimum of 3" (75 mm) above the drop ceiling tiles.
 - When installed under a raised floor, wire mesh cable tray shall be installed with a minimum 3/4" (19 mm) clearance between the top of the tray and the bottom of the floor tiles or floor system stringers, whichever are lower in elevation. Maintain a 3" (75 mm) clearance between trays wherever trays cross over.
 - Wire mesh cable tray shall be supported every 6' (1.8 m) of span or less. Support wire mesh cable tray within 2' (0.6 m) of every splice and intersection. Support intersections on all sides. Support wire mesh cable tray on both sides of every change in elevation/direction. The weight of the load on the cable tray must not exceed the stated limits per span in the manufacturer's published load table. Use additional supports where needed.
 - Secure wire mesh cable tray to each support with a minimum of one fastener. Follow the manufacturers' recommended assembly, splice and intersection-forming practices.
 - Use installation tools and practices recommended by the manufacturer to field fabricate wire mesh cable tray intersections and changes in elevation. Use side-action bolt cutters with an offset head to cut wire mesh cable tray.
 - Wire mesh cable tray shall be bonded to the Telecommunications Grounding Busbar (TGB) using an approved ground lug on the wire basket tray and a minimum #6 grounding wire or as recommended by the AHJ. Follow UL Classified splicing methods recommended by the manufacturer, ground the tray per NEC requirements and verify bonds at splices and intersections between individual cable tray sections. Cable pathway should be electrically continuous through bonding and attached to the TGB.
 - The quantity of cables within the tray will not exceed a whole number value equal to 50% of the interior area of the tray divided by the cross-sectional area of the cable. Cable fill will not exceed the depth of the cable tray's side rail [2" (50 mm), 4" (100 mm) or 6" (150 mm)].
 - The combined weight of cables within the tray will not exceed stated load

- capacity in manufacturer's specifications.
 - Separate different media type within the tray. Treat each type of media separately when determining cable fill limits.
 - When pathways for other utilities or building services are within 2' (0.6 m) of the wire mesh cable tray, cover the tray after cables are installed.
7. Pull boxes
- Pull boxes shall be installed in easily accessible locations.
 - Pull boxes installed as part of a horizontal cabling pathway shall be installed immediately above suspended ceilings, where possible.
 - Pull boxes shall not be used for splicing cable.
 - Pull boxes shall be placed in conduit runs that exceed 100 feet or which require more than two 90 degree bends. The pull boxes shall be located in straight sections of conduit and must not be used for a right angle bend. Installation shall allow cable to pass through from one conduit to another in a direct line.
 - Pull boxes must have a length at least 12 times the diameter of the largest conduit.

B. EXISTING OUTLET BOXES, RACEWAYS, AND CONDUITS

1. Existing recessed boxes and concealed station conduits may only be re-used as a pathway for a new outlet per the criteria below:
- Existing recessed single-gang box with a $\frac{3}{4}$ inch diameter station conduit: One new voice or data outlet (1 cable maximum).
 - Existing recessed single-gang outlet with a 1 inch diameter station conduit: One new voice/data outlet or one new voice/data/fiber outlet. (3 cables maximum) (Only acceptable in offices and classrooms where wire cannot be fished in existing walls.) For outlets with fiber cable terminations, faceplates must be equipped with a spool to provide for a maintenance loop per manufacturer's specifications.

C. GROUNDING AND BONDING SYSTEMS

1. Grounding and bonding - GENERAL

- a. Installation: The Contractor shall provide grounding and bonding in accordance with the requirements of NFPA 70, IEEE 142, TIA/EIA 568, TIA/EIA 607, state and local codes, the campus standards and to requirements specified herein. Codes shall be complied with as a minimum requirement, with these specifications prevailing when they are more stringent.
- b. Bonding
- Metallic conduits, wireways, metal enclosures of busways, cable boxes, equipment housings, cable racks and all non-current carrying metallic parts of the installed telecommunications services shall be grounded with #6 AWG copper wire. The metallic conduit system shall be used for equipment and enclosure grounding but not as a system ground conductor.
 - All metallic conduit stub-ups shall be grounded, and where multiple stub-ups are made within an equipment enclosure, they shall be equipped with

grounding bushings and bonded together and to the enclosure and the enclosure ground bus.

- Each metallic raceway, pipe, duct and other metal object entering the buildings shall be bonded together. The Contractor shall use #6 AWG bare copper conductors.
- The Contractor shall bond telecommunications equipment and busbars separately.

2. Signal Reference Grounding and Bonding

a. Each identified telecommunications space within a building shall have a common signal reference ground. The signal reference ground shall conform to the following:

- Within the building, all communication spaces shall be separately bonded to each other and connected to the primary building ground in accordance with the provisions of TIA/EIA 607. The communication ground shall not ground any other equipment or be connected to any potential high voltage source. All racks, frames, drain wires, and all installed communication equipment shall only be grounded to this common reference ground with a minimum size #6 AWG copper wire.
- The Contractor shall provide, as a minimum, a continuous #3/0 AWG green electrical conductor connected to a 1/4" x 4" x 5.25" telecommunications grounding bus bar (TGB) 6" AFF on the plywood backboard of each IDF (or telecommunication space) to terminate chassis and other equipment grounds.
- The ground wires from each individual IDF shall be routed directly to the Building Distribution Frame (BDF), terminated and bonded together via a telecommunications main grounding bus bar (TMGB) of minimum 1/4" x 4" x 12" dimensions. This point of single reference for all closets in a building shall in turn be grounded with a minimum #3/0 AWG ground conductor to the main building ground. If a main building ground is unavailable, the ground wire from the BDF shall be grounded to the nearest electrical panel ground bus bar. The building ground for signal reference shall be the building service entrance ground.

b. Riser/Tie Cable Bonding

- There shall be no bonding between the entry cable and the inside riser or distribution cable.
- All riser and tie cable shields shall be bonded into a single continuous path end-to-end and grounded on each floor in which pairs leave the sheath. Cable shields shall be grounded to the signal reference ground provided in each telecommunication space.

3. Grounding and Bonding Testing and Inspection Procedures

a. As an exception to requirements that may be stated elsewhere in these documents, the Inspector of Record shall be given five (5) working days' notice prior to each test. The Contractor shall provide all test equipment and personnel and shall provide written copies of all test results.

b. Grounding and bonding system conductors and connections shall be

inspected for tightness and proper installation.

- c. The Contractor shall provide personnel and test equipment for point-to-point resistance tests before connecting equipment. Perform point-to-point tests in each building to determine the resistance between the main grounding system and all BDF/IDF ground bus bars. Investigate and correct point-to-point resistance values that exceed 0.5 ohm. The Contractor shall record resistance measurements at all test point locations.

D. INFORMATION OUTLETS

1. GENERAL REQUIREMENTS

- a. Station outlets shall be mounted securely at work area locations.
- b. Station outlets shall be located so that the cable required to reach the desktop equipment is no more than 10 feet long.
- c. Station outlets should not be “daisy-chained.”
- d. Outlets shall be mounted as follows:
 - Wall phone: 48 inches above the finished floor.
 - Standard voice/data outlet: 15 inches above the finished floor.
 - Wall-mounted video outlet: 78 inches above the finished floor.
 - Counter top: 6 inches above the counter top.

2. MODULAR FURNITURE TELECOMMUNICATIONS OUTLETS

- a. The Contractor shall provide and install all components and labor necessary to completely install, test, and document voice and data telecommunications outlets at each modular furniture workstation location.
- b. Category 6 station cable shall be placed from the BDF, through the riser sleeves, through the cable tray system into the conduit, ceiling or floor poles, etc. into the furniture to be served.
- c. The Contractor shall coordinate the telecommunications and electrical installation so that the modular furniture is served from the joint signal/power floor monuments or joint power pole in a consistent manner. The Contractor shall provide and install all fittings, flex conduit, adapter plates, and telecommunications cable and components necessary to install Category 6 station cable from the consolidation point box, through the ceiling or floor monument or pole, into the furniture raceway, and to the final user outlet location (including jacks, adapters, and faceplates).
- d. The telecommunications installers shall coordinate with the electrical drawings for the number and location of user voice and data outlets.
- e. Labels shall be numbered according to a scheme developed in consultation with the owner’s representative. Owner to approve label scheme prior to printing.

E. GROUNDING AND BONDING

1. The facility shall be equipped with a Telecommunications Bonding Backbone (TBB). This backbone shall be used to ground all telecommunications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has the potential to act as a current carrying conductor.
2. The TBB shall be installed independent of the building’s electrical and building

ground and shall be designed in accordance with the recommendations contained in the ANSI/TIA/EIA-607 Telecommunications Bonding and Grounding Standard.

3. The main entrance facility/equipment room in each building shall be equipped with a telecommunications main grounding bus bar (TMGB).
4. The TMGB shall be connected to the building electrical entrance grounding facility. The intent of this system is to provide a grounding system that is equal in potential to the building electrical ground system. Therefore, ground loop current potential is minimized between telecommunications equipment and the electrical system to which it is attached.
5. All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. shall be grounded to the respective TGB or TMGB using a minimum #6 AWG stranded copper bonding conductor and compression connectors.
6. All wires used for telecommunications grounding purposes shall be identified with a green insulation. Non-insulated wires shall be identified at each termination point with a wrap of green tape.
7. All cables and bus bars shall be identified and labeled in accordance with the System Documentation Section of this specification.
8. Wall-Mount Busbars
 - Attach busbars to the wall with appropriate hardware according to the manufacturer's installation instructions.
 - Conductor connections to the TMGB or TGB shall be made with two-hole bolt-on compression lugs sized to fit the busbar and the conductors.
 - Each lug shall be attached with stainless steel hardware after preparing the bond according to manufacturer recommendations and treating the bonding surface on the busbar with antioxidant to help prevent corrosion at the bond.
 - The wall-mount busbar shall be bonded to ground as part of the overall Telecommunications Bonding and Grounding System.
9. Rack-Mount Busbars and Ground Bars
 - When a rack or cabinet supports active equipment or any type of shielded cable or cable termination device requiring a ground connection, add a rack-mount horizontal or vertical busbar or ground bar to the rack or cabinet. The rack-mount busbar or ground bar provides multiple bonding points on the rack for rack and rack-mount equipment.
 - Attach rack-mount busbars and ground bars to racks or cabinets according to the manufacturer's installation instructions.
 - Bond the rack-mount busbar or ground bar to the room's TMGB or TGB with appropriately sized hardware and conductor.
10. Ground Terminal Block
 - Every rack and cabinet shall be bonded to the TMGB or TGB.
 - Minimum bonding connection to racks and cabinets shall be made with a rack-mount two-hole ground terminal block sized to fit the conductor and

- rack and installed according to manufacturer recommendations.
 - Remove paint between rack/cabinet and terminal block, clean surface and use antioxidant between the rack and the terminal block to help prevent corrosion at the bond.
11. Pedestal Clamp
- At minimum, bond every sixth raised access floor pedestal with a minimum #6 AWG conductor to the TMGB or TGB using a pedestal clamp sized to fit the pedestal and the conductor and installed according to the manufacturer's recommendations.
 - If pedestal clamps are used to construct a signal reference grid, bond the signal reference grid to the TMGB or TGB and bond each rack and/or cabinet to the signal reference grid using a compression tap or similar non-reversible bonding component sized to fit both conductors.
 - Remove paint between the pedestal and pedestal clamp, clean surface and use antioxidant between the pedestal and the clamp to help prevent corrosion at the bond.
 - Remove insulation from conductors where wires attach to the pedestal clamp.
12. Pipe Clamp
- Bond metal pipes located inside the data center computer room with a minimum #6 AWG conductor to the TMGB or TGB using a pipe clamp sized to fit the pipe and the conductor and installed according to the manufacturer's recommendations.
 - Remove paint between the pipe and pipe clamp, clean surface and use antioxidant between the pipe and the clamp to help prevent corrosion at the bond.
 - Remove insulation from conductors where wires attach to the pipe clamp.
13. Equipment Ground Jumper Kit
- Bond equipment to a vertical rack-mount busbar or groundbar using ground jumper according to the manufacturer's recommendations.
 - Clean the surface and use antioxidant between the compression lugs on the jumper and the rack-mount busbar or groundbar to help prevent corrosion at the bond.

F. FIRE STOP SYSTEM

1. The fire stop system is comprised of the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure.
2. Fire stop systems comprise an effective block for fire, smoke, heat, vapor and pressurized water stream.
3. All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate fire stop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall use the proper fire stop equipment.

4. Fire stop systems shall be UL Classified to ASTM E814 (UL 1479).

3.3 System Closeout and As-built Documentation

- A. Upon completion of the installation, the telecommunications contractor shall provide three (3) full documentation sets to the Owner's Representative/Engineer for approval. One (1) to be a hardcopy and two (2) to be electronic copies. Documentation shall include the items detailed in the sub-sections below.
- B. Documentation shall be submitted within ten (10) working days of the completion of each construction phase. This is inclusive of all test results and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 calendar days of the completion of each testing phase. At the request of the Owner's Representative/Engineer, the telecommunications contractor shall provide copies of the original test results.
- C. The As-Built drawings are to include conduit routes, utility vault/pull box locations, surface mount enclosure locations, PVC to GRC transition points and the approved labeling identifiers. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. The Owner will provide floor plans in paper and electronic (DWG, AutoCAD 2008) formats on which as-built construction information can be added. These documents will be modified accordingly by the telecommunications contractor to denote as-built information as defined above and returned to the Owner.

END OF SECTION

271000 – STRUCTURED CABLING SYSTEM

PART 1 – GENERAL

1.01 SCOPE OF WORK:

- A. This document describes the requirements for the contractors, products and installation relating to furnishing and installing a Structured Cabling Plant.
- B. The Cabling System as described in this document is comprised of cabling, infrastructure and termination hardware to provide an approved TIA/EIA Data Networking and Voice Communication Structured Cabling System.
- C. Provide all labor, materials, tools and equipment required for the complete installation of work called for on the Construction Drawings and described in the Specifying Documentation.
- D. 271000 contractors shall be complete with work including all testing and labeling prior to 272000 contractor work start. Owner requires a minimum of 5 days to review test documents prior to work start up.

1.02 CONTRACTOR QUALIFICATIONS/QUALITY ASSURANCE:

- A. Safety and Indemnity
 - 1. Contractors will submit the necessary documentation to demonstrate their compliance with Section 270000 “1.5 A. Safety & Indemnity”.
- B. Contractor Qualifications
 - 1. Contractors will submit the necessary documentation to demonstrate their compliance with Section 270000 “1.5 B. Contractor Qualification”.
- C. Quality Assurance
 - 1. Contractor shall comply with all requirements as specified in Section 270000 “1.5 C. Quality Assurance”.
- D. Warranty
 - 1. Contractor shall comply with all requirements as specified in Section 270000 “1.8. Acceptance & Warranties”.
 - 2. The bid package shall be accompanied by a warranty commitment binding the awarded contractor and manufacturer to a Lifetime Structured Cabling Warranty with guaranteed performance criteria set forth in this document and/or set forth by the Manufacturer. Contractor must be trained and certified in the installation of the Manufacturer system proposed. Contractor shall submit proof of current certification in the Certified Installer Program as a Premier or Authorized Network Installer in order to install and fully warrant the Cabling System. Copy

of current Certificate must be included in Proposal if not already on file with Architect/Consultant/Owner.

3. A Lifetime warranty (or 25yr minimum) for the structured cabling system shall be provided for an end-to-end permanent link model installation which covers the performance of the cable, connecting hardware and the labor cost for the repair or replacement of the link.
4. Links failing test parameters or producing marginal pass results will be retested or replaced at Contractor expense until link test results passing TIA/EIA Standard parameters for the category rating or better are achieved.
5. Warranty application is to be submitted in advance of the project start, and full test reports shall be delivered to Manufacturer within 15 days of project completion. Lifetime Manufacturer warranty processing is to be completed by Contractor and warranty certificate delivered to owner upon project completion.

1.03 SUBMITTAL DOCUMENTATION

- A. The successful contractor shall provide their submittal package in accordance with the Section 01 20 00 1.06 Submittal Schedule, and Section 270000 “1.6 Submittal Documentation”.

1.04 EQUIVALENT PRODUCTS

- A. All Products Leviton, Berk-Tek, Superior Essex, and Chatsworth form the basis of design for this Specification. Part numbers, where provided, exemplify the feature set expected to be provided for this Structured Cabling Plant.
- B. Pre-Approved Equals:
 1. None, all alternate materials must be submitted for approval prior to bid.
- C. Structured cabling manufacture system warranties shall be Limited Lifetime or 25 year.
- D. Contractors wishing to approve a system other than those specified in this document shall do so in accordance with Section 270000 “1.7 Equivalent Products”.

1.05 TYPICAL CONFIGURATIONS

- A. All room configurations are based on the “Learning Wall” and entry door. All locations shall be installed per plan. Classrooms shall have on average 17 Cat6 cables in each room;
 1. Entry door shall have ONE Cat6 cable for IP wall phone (one voice).
 2. Four (4) Cat6 cables, with two on each side of the whiteboard (two data, two voice)
 3. Student work area shall have eight (8) Cat6 cables (8 data)

4. Ceiling area shall have four (4) Cat6 cables (one for the A/V projector, one for the A/V switcher, and two for wireless access point). A red colored dot is to be placed on the ceiling grid to mark the location of these four cables.
 5. Depending on the orientation of the room, two additional Cat6 cables may be added to allow for teacher flexibility.
- B. Computer labs shall have 48 Cat6 cables in each room
1. Entry door shall have ONE Cat6 cable for IP wall phone (one voice).
 2. Computer labs shall have FORTY Cat6 cables.
 3. Standard A/V classroom install is included: A/V Control Panel, two input modules, and either wall or pole mounts.
 4. Ceiling area shall have four Cat6 cables (one A/V projector, one A/V switcher, two wireless access point). A red colored dot is to be placed on the ceiling grid to mark the location of these four cables.
 5. Three Cat6 for the teacher (phone, computer, and printer).
- C. All rooms shall be field verified prior to installation.

PART 2 – PRODUCTS

2.01 WORK AREA SUBSYSTEM

- A. The Work Area shall consist of the connectivity equipment used to connect the horizontal cabling subsystem and the equipment in the work area. The connectivity equipment shall include the following options:
- Patch Cords
 - Modular Inserts and Jacks
 - Faceplates
1. Category 6 and Category 6A Outlet Patch Cords
 - OWNER PROVIDED
- B. Modular Inserts and Jacks
2. Category 6A Keystone Jack (for Wireless and other uses as specified)
 - Jacks must meet or exceed the Category 6A standard.
 - Jacks shall be 8-position 8-conductor RJ45-style and must have "retention- force technology" or equivalent feature to prevent time damage over the life of the jack regardless of use
 - Jacks shall be 8 position un-keyed

- Jack shall be rear-terminated industry- standard 110 IDC. Lead-frame jacks shall not be used in this Cable Plant.
- Jacks shall have a designation indicating Category 6A on the nose which can be plainly seen from the front of the faceplate. Bottom of jack shall have date code.
- Jacks shall utilize a paired punch down sequence. Cable pair twists shall be maintained up to the IDC, terminating all conductors adjacent to its pair mate to better maintain pair characteristics designed by the cable manufacturer.
- Jacks shall terminate 22-26 AWG stranded or solid conductors.
- Jacks shall be compatible with single conductor 110 impact termination tools.
- Jacks shall have an attached color coded wiring instruction label housed between the IDC termination towers.
- Jacks shall be manufactured in the USA
- Jacks shall be compatible with TIA/EIA 606 color code, and have removable high-visibility color labels designating pair locations. Split-colored T568A/B labels are not approved.
- Jacks shall utilize pair-separation towers for ease of untwisting pairs, and shall employ a snap-on rear termination cover designed for suppression and isolate of cross-talk of neighboring connectors.
- Jacks will be terminated according to the T568B wiring scheme.
- Color:
 - Data Jacks will be BLUE
 - Voice Jacks will be WHITE
 - Wireless Jacks will be YELLOW
 - A/V Jacks will be GRAY
 - Camera Jacks will be PURPLE
- Quantity: Contractor will provide and install one jack for every outlet cable shown on the drawings.
 - Part#:
 - Data Jacks will be 61110-RL6
 - Voice Jacks will be 61110-RW6
 - Wireless Jacks will be 61110-RY6
 - A/V Jacks will be 61110-RG6
 - Camera Jacks will be 61110-RP6 1. Category 6 Keystone Jack (for General-Purpose Data/Voice applications)
- Jacks must exceed the Category 6 standard, and must be Component-Rated for performance.
- Jacks shall be 8-position 8-conductor RJ45-style and must have "retention- force technology" or equivalent feature to prevent time damage over the life of the jack regardless of use
- Jacks shall be 8 position un-keyed
- Jack shall be rear-terminated industry- standard 110 IDC. Lead-frame jacks shall not be used in this Cable Plant.
- Jacks shall have a designation indicating Category 6 on the nose which can be plainly seen from the front of the faceplate. Bottom of jack shall have date code.
- Jacks shall utilize a paired punch down sequence. Cable pair twists shall be maintained up to the IDC, terminating all conductors adjacent to its

pair mate to better maintain pair characteristics designed by the cable manufacturer.

- Jacks shall terminate 22-26 AWG stranded or solid conductors.
- Jacks shall be compatible with single conductor 110 impact termination tools.
- Jacks shall have an attached color coded wiring instruction label housed between the IDC termination towers.
- Jacks shall be manufactured in the USA
- Jacks shall be compatible with TIA/EIA 606 color code, and have removable high-visibility color labels designating pair locations. Split-colored T568A/B labels are not approved.
- Jacks shall utilize pair-separation towers for ease of untwisting pairs, and shall employ a snap-on rear termination cover designed for suppression and isolate of cross-talk of neighboring connectors.
- Jacks will be terminated according to the T568B wiring scheme.
- Color:
 - Data Jacks will be BLUE
 - Voice Jacks will be WHITE
 - Wireless Jacks will be YELLOW
 - A/V Jacks will be GRAY
 - Camera Jacks will be PURPLE
- Quantity: Contractor will provide and install one jack for every outlet cable shown on the drawings.
 - Part#:
 - Data Jacks will be 61110-RL6
 - Voice Jacks will be 61110-RW6
 - Wireless Jacks will be 61110-RY6
 - A/V Jacks will be 61110-RG6
 - Camera Jacks will be 61110-RP6

C. Wall Mount and Modular Furniture Faceplates

1. Wall Plates

- Faceplates shall be UL Listed and CSA Certified
- Faceplates shall be 2.75" W x 4.5" H (69.8 mm x 114.3 mm)
- Faceplates shall provide for TIA/EIA 606 compliant station labeling.
- Faceplates shall have plastic covers over the mounting screws that can be replaced with a clear plastic window over a printable paper insert.
- Faceplates shall have an industry-standard KEYSTONE opening style, and shall accept any Keystone modular insert.
- Faceplates shall be made in the U.S.A.
- Color: Faceplate to be WHITE
- Quantity: Contractor will provide and install one single gang faceplate for each outlet shown on the drawings.
- Part#:
 - 6 Port Face Plate, PN# 42080-6WS
 - 4 Port Face Plate, PN# 42080-4WS
 - 2 Port Face Plate, PN# 42080-2WS

2. Blank Insert
 - Color: Blank Insert to match device place or raceway.
 - Quantity: Contractor will provide and install one insert for every unused port in a faceplate.
 - Part#: 41084-B*B
3. Blank Wall Plates
 - Faceplate shall be constructed from stainless steel.
 - Faceplates shall be UL Listed and CSA Certified
 - Faceplates shall be 2.75" W x 4.5" H (69.8 mm x 114.3 mm) for single gang.
 - Color: Faceplate to be STAINLESS STEEL
 - Quantity: Contractor will provide and install one faceplate for each unused data/voice/video/intercom outlet shown on the drawings.
 - Part#: 84014-40
4. Surface Mount Raceway Insert
Inserts for Wiremold's 4050, 5450 and 5550 Device Mounting Brackets
 - Insert shall allow for two category 6 jacks to be mounted flush.
 - Insert shall match the color of the Raceway installed.
 - Color: Faceplate to be IVORY
 - Quantity: Contractor will provide and install one 2-port insert for each outlet in the Surface Mount Raceway shown on the drawings.
 - Part#: Equal to Wiremold, PN# 5507-FRJ

2.02 HORIZONTAL DISTRIBUTION CABLING

The horizontal distribution cabling system is the portion of the telecommunications cabling system that extends from the Work Area (WA) telecommunications outlet/connector to the horizontal cross-connect in the Telecommunications Room (TR).

- Cabling Support System
 - Copper Station Cabling
 - Copper Cross-Connect Cabling
- A. Copper Station Cable

1. Category 6A Unshielded Twisted Pair (UTP) Cable
 - Cable will meet or exceed the proposed requirements of ANSI/TIA 568-C.2 and ISO/IEC 11801 Category 6 Cable Standard for: NEXT and ELFEXT (Pair-To-Pair and Power Sum), Insertion Loss (Attenuation), Return Loss, PSANEXT, and Delay Skew.
 - Cable shall be proven to support 10 Gigabit Ethernet / 10GBASE-T, Gigabit Ethernet / IEEE 802.3an, Gigabit Ethernet / 1000BASE-T / IEEE 802.3ab, ATM up to 155 Mbps, IEEE 802.3af Power Over Ethernet for

VoIP, 100 Mbps Fast Ethernet / 100BASE-T / IEEE 802.3, ANSI.X3.263 FDDI TP-PMD, Ethernet / 10BASE-T / IEEE 802.3, 4 & 16 Mbps Token Ring / IEEE 802.5, T1/E1, xDSL, ISDN, 550 MHz Broadband Video and standards under development such as ATM at 622 Mbps, 1.2 and 2.4 Gbps.

- The cable shall consist of four unshielded twisted pairs of thermoplastic insulated bare copper enclosed in a thermoplastic jacket.
- All cable shall conform to the requirements for communications circuits defined by the California Electrical Code (Article 800) and the Canadian Building Code. Cable listed to CEC Article 800-51(a) will be used for “Plenum” installations. Cable listed to CEC Article 800-51(b) shall be installed in vertical runs penetrating more than one floor.
- Cable shall have been certified with the UL 1666 Vertical Tray Flame Test.
- Cable shall be available in a Plenum, Riser and Indoor/Outdoor rated jackets.
- Contractor will use the indoor/outdoor rated cable for all locations where the cable pathway goes underground and/or run in exterior conduit.
- Cables shall be made in the U.S.A.
- The listed Category 6A cables in this specification are manufactured by Berk- Tek
- Color:
 - Data cable jacket will be BLUE
 - Data cable for Security Cameras will be PURPLE
 - Data cable for Access Control will be GREEN
- Quantity: See Drawing for quantity and installation details.
- Part#:
 - For Riser Application:
Berk-Tek LANmark-10G2, PN# 11084689
 - For Plenum Application:
Berk-Tek LANmark-10G2, PN# 11085339
 - For Indoor/Outdoor Application:
Berk-Tek LANmark 10G OSP

2. Category 6 Unshielded Twisted Pair (UTP) Cable

- Cable will meet or exceed the proposed requirements of ANSI/TIA/EIA 568- C.2, 568-B.2 Addendum #1 and ISO/IEC 11801 Category 6 Cable Standard for: NEXT and ELFEXT (Pair-To-Pair and Power Sum), Insertion Loss (Attenuation), Return Loss, and Delay Skew.
- Cable shall be proven to support Gigabit Ethernet / 1000BASE-T / IEEE 802.3ab, ATM up to 155 Mbps, IEEE 802.3af Power Over Ethernet for VoIP, 100 Mbps Fast Ethernet / 100BASE-T / IEEE 802.3, ANSI.X3.263 FDDI TP- PMD, Ethernet / 10BASE-T / IEEE 802.3, 4 & 16 Mbps Token Ring / IEEE 802.5, T1/E1, xDSL, ISDN, 550 MHz Broadband Video and standards under development such as ATM at 622 Mbps, 1.2 and 2.4 Gbps.
- The cable shall consist of four unshielded twisted pairs of thermoplastic insulated bare copper enclosed in a thermoplastic jacket.
- All cable shall conform to the requirements for communications circuits

defined by the California Electrical Code (Article 800) and the Canadian Building Code. Cable listed to CEC Article 800-51(a) will be used for “Plenum” installations. Cable listed to CEC Article 800-51(b) shall be installed in vertical runs penetrating more than one floor.

- Cable shall have been certified with the UL 1666 Vertical Tray Flame Test.
- Cable shall be available in a Plenum, Riser and Indoor/Outdoor rated jackets.
- Contractor will use the indoor/outdoor rated cable for all locations where the cable pathway goes underground and/or run in exterior conduit.
- Cables shall be made in the U.S.A.
- The listed Category 6 cables in this specification are manufactured by Berk- Tek
- Color:
Data cable jacket will be BLUE
Data cable for Security Cameras will be PURPLE
Data cable for Access Control will be GREEN
- Quantity: See Drawing for quantity and installation details.
- Part#:
For Riser Application:
Superior Essex PN# 77-240-2A or
Berk-Tek PN# 10136339
For Plenum Application:
Superior Essex PN# 77-240-2B or
Berk-Tek PN# 10136226 For
Indoor/Outdoor Application:
Mohawk CDT PN# M58772 (all cable jackets will be BLACK)

B. Horizontal Copper Cross-Connect Cabling

1. Voice Cross-Connect Cabling

- Cable shall meet and/or exceed the UL Listed Type CMR and the ANSI/ICEA S-80-576 standard.
- Cables shall be made in the U.S.A.
- Core Construction
- Conductors: Solid-copper conductors, 24 AWG.
- Insulation: Flame retardant semi-rigid PVC.
- Core Assembly: Cable core will be made up of 100 pair units consisting of four (4) 25 pair sub-units. Each group individually identifiable by color coded unit binders.
- Jacket: Gray, flame retardant PVC jacket.
- Color: Voice cable jacket will be GRAY
- Quantity: See Drawing for quantity and installation details. The number of 25-pair cable between the MDF and the IDF shall be derived by multiplying the number of pairs required for the cross-connect by 1.25 to the nearest 25-pair increment.
- Part#:

Superior Essex Cable:	Berk-Tek:
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25 pair = PN# 18-475-33	10032396
50 pair = PN# 18-579-33	10032471
100 pair = PN# 18-789-33	10032472

2.03 BACKBONE CABLING

The backbone cabling system is the portion of the telecommunications cabling system that extends from the Intermediate Distribution Frame (IDF) to the Main Distribution Frame (MDF).

- Fiber Optic Backbone Cabling
- Copper Backbone Cabling

A. Fiber Optic Backbone Cabling

1. Data System Backbone Cabling

- Cable shall be UL/cUL OFNR/OFN FTA rated and be Flame Resistant in accordance with the UL 1666.
- Cable shall an OSP.
- Cable shall be constructed utilizing a loose tube design.
- Cable will be fully water blocked combining overall water blocking tape and a moisture blocking gel for each individual tube.
- Cable will maintain the following:
 - Crush Resistance (EIA-455-41) = 2000 N/cm
 - Impact Resistance (EIA-455-25) = 2000 Impacts w/1.6 N-m
 - Min Bend Radius:
 - Long Term - No Load = 15x Cable diameter
 - Short Term – Load = 20x Cable diameter
 - Operating Temp. = -40°C to +70°C
 - Storage Temp. = -40°C to +80°C
 - Cable shall be constructed of 50/125µ Laser Optimized rated glass capable of:
 - 1 Gigabit Ethernet Link at 1000m/600m (@850nm/1300nm)
 - 10 Gigabit Ethernet Link at 300m/300m (@850nm/1300nm)
- ALL FIBER SHALL BE FUSION SPLICED
- The Fiber Optic Cable in this specification is manufactured by Berk-Tek
- Color: Fiber Optic cable jacket will be Black
- Quantity: See Drawing for quantity and installation details.
- NOTE: HYBRID CABLES ARE PREFERRED OVER SEPARATE RUNS OF EACH TYPE OF CABLE. PROVIDE JUSTIFICATION IF YOU ARE NOT ABLE TO USE THE HYBRID CABLE.
- THE CABLES LISTED BELOW ARE ARMORED CABLE. CONTRACTOR IS REPOSNBILE TO VERIFY DIAMETER OF CABLES NEEDED VERSUS AVAILBLE CONDUIT PATHWAY. ARMORED CABLE IS PREFERRED FOR ANY CABLING BETWEEN BULDINGS. IF ARMORED CABLE CANNOT BE USED, CONTRACTOR TO NOTIFY OWNER IN WRITING AT A MIMUMUM OF 30 WORKING DAYS PRIOR TO CABLE INSTALLATION.

- Field Breakout Kits: Leviton PN# 49887-12S is to be used for all cables more than 6 strands. Six strand cables will use 49887-06S. Provide two kits per buffer tube to be terminated.

6 Strand Armored Single Mode Fiber (needs two breakout kits) Equal to Berk-Tek, PN# LTRK006AB0403

12 Strand Armored Single Mode Fiber (needs two breakout kits) Equal to Berk-Tek, PN# LTRK012AB0403

24 Strand Armored Single Mode Fiber (needs four breakout kits) Equal to Berk-Tek, PN# LTRK12B024AB0403

36 Strand Armored Single Mode Fiber (needs six breakout kits) Equal to Berk-Tek, PN# LTRK12B036AB0403

48 Strand Armored Single Mode Fiber (needs eight breakout kits) Equal to Berk-Tek, PN# LTRK12B048AB0403

60 Strand Armored Single Mode Fiber (needs ten breakout kits) Equal to Berk-Tek, PN# LTRK12B060AB0403

72 Strand Armored Single Mode Fiber (needs twelve breakout kits) Equal to Berk-Tek, PN# LTRK12B072AB0403

6 Strand Armored Multi Mode Fiber (needs two breakout kits) Equal to Berk-Tek, PN# LTRK006EB3010/25

12 Strand Armored Multi Mode Fiber (needs two breakout kits) Equal to Berk-Tek, PN# LTRK012EB3010/25

24 Strand Armored Multi Mode Fiber (needs four breakout kits) Equal to Berk-Tek PN# LTRK12B024EB3010/25

36 Strand Armored Multi Mode Fiber (needs six breakout kits) Equal to Berk-Tek PN# LTRK12B036EB3010/25

48 Strand Armored Multi Mode Fiber (needs eight breakout kits) Equal to Berk-Tek PN# LTRK12B048EB3010/25

60 Strand Armored Multi Mode Fiber (needs ten breakout kits) Equal to Berk-Tek PN# LTRK12B060EB3010/25

72 Strand Armored Multi Mode Fiber (needs twelve breakout kits) Equal to Berk-Tek PN# LTRK12B072EB3010/25

Hybrid 6 Armored Strand Multi Mode, 6 Strand Single Mode Fiber
(needs 2 breakout kits)
Equal to Berk-Tek, PN# LTRK012-006EB3010/25-006AB0403

Hybrid 12 Armored Strand Multi Mode, 12 Strand Single Mode Fiber

(needs 4 breakout kits)

Equal to Berk-Tek, PN# [LTRK12B024-012EB3010/25-012AB0403](#)

Hybrid 18 Armored Strand Multi Mode, 18 Strand Single Mode Fiber

(needs 6 breakout kits)

Equal to Berk-Tek, PN# [LTRK12B036-018EB3010/25-018AB0403](#)

Hybrid 24 Armored Strand Multi Mode, 24 Strand Single Mode Fiber

(needs 8 breakout kits)

Equal to Berk-Tek, PN# [LTRK12B048-024EB3010/25-024AB0403](#)

Hybrid 36 Armored Strand Multi Mode, 36 Strand Single Mode Fiber

(needs 12 breakout kits)

Equal to Berk-Tek, PN# [LTRK12B072-036EB3010/25-036AB0403](#)

Hybrid 48 Armored Strand Multi Mode, 48 Strand Single Mode Fiber

needs 16 breakout kits)

Equal to Berk-Tek, PN# [LTRK12B096-048EB3010/25-048AB0403](#)

Hybrid 60 Armored Strand Multi Mode, 60 Strand Single Mode Fiber

(needs 20 breakout kits)

Equal to Berk-Tek, PN# [LTRK12B120-060EB3010/25-060AB0403](#)

Hybrid 72 Armored Strand Multi Mode, 72 Strand Single Mode Fiber

(needs 24 breakout kits)

Equal to Berk-Tek, PN# [LTRK12B144-072EB3010/25-072AB0403](#)

NON-ARMORED CABLE – NOTIFY OWNER WITH JUSTIFICATION AS TO WHY THE NON-ARMORED CABLE IS RECOMMEND FOR USE BY CONTRACTOR AT LEAST 30 WORKING DAYS PRIOR TO SCHEDULE INSTALLATION.

6 Strand Single Mode Fiber (needs two breakout kits) Equal to Berk-Tek, PN# [LTR006AB0403](#)

12 Strand Single Mode Fiber (needs two breakout kits) Equal to Berk-Tek, PN# [LTR012AB0403](#)

24 Strand Single Mode Fiber (needs four breakout kits) Equal to Berk-Tek, PN# [LTR12B024AB0403](#)

36 Strand Single Mode Fiber (needs six breakout kits) Equal to Berk-Tek, PN# [LTR12B036AB0403](#)

48 Strand Single Mode Fiber (needs eight breakout kits) Equal to Berk-Tek, PN# [LTR12B048AB0403](#)

60 Strand Single Mode Fiber (needs ten breakout kits) Equal to Berk-Tek, PN# [LTR12B060AB0403](#)

72 Strand Single Mode Fiber (needs twelve breakout kits) Equal to Berk-

Tek, PN# LTR12B072AB0403

6 Strand Multi Mode Fiber (needs two breakout kits) Equal to Berk-Tek,
PN# LTR006EB3010/25

12 Strand Multi Mode Fiber (needs two breakout kits) Equal to Berk-Tek,
PN# LTR012EB3010/25

24 Strand Multi Mode Fiber (needs four breakout kits) Equal to Berk-Tek
PN#LTR12B024EB3010/25

36 Strand Multi Mode Fiber (needs six breakout kits) Equal to Berk-Tek
PN#LTR12B036EB3010/25

48 Strand Multi Mode Fiber (needs eight breakout kits) Equal to Berk-
Tek PN#LTR12B048EB3010/25

60 Strand Multi Mode Fiber (needs ten breakout kits) Equal to Berk-Tek
PN#LTR12B060EB3010/25

72 Strand Multi Mode Fiber (needs twelve breakout kits) Equal to Berk-
Tek PN#LTR12B072EB3010/25

Hybrid 6 Strand Multi Mode, 6 Strand Single Mode Fiber (needs 2
breakout kits)
Equal to Berk-Tek, PN# LTR012-006EB3010/25-006AB0707

Hybrid 12 Strand Multi Mode, 12 Strand Single Mode Fiber (needs 4
breakout kits)
Equal to Berk-Tek, PN# LTR024-012EB3010/25-012AB0403

Hybrid 18 Strand Multi Mode, 18 Strand Single Mode Fiber (needs 6
breakout kits)
Equal to Berk-Tek, PN# LTR036-018EB3010/25-018AB0403

Hybrid 24 Strand Multi Mode, 24 Strand Single Mode Fiber (needs 8
breakout kits)
Equal to Berk-Tek, PN# LTR048-024EB3010/25-024AB0403

Hybrid 36 Strand Multi Mode, 36 Strand Single Mode Fiber (needs 12
breakout kits)
Equal to Berk-Tek, PN# LTR12B072-036EB3010/25-036AB0403

Hybrid 48 Strand Multi Mode, 48 Strand Single Mode Fiber (needs 16
breakout kits)
Equal to Berk-Tek, PN# LTR12B096-048EB3010/25-048AB0403

Hybrid 60 Strand Multi Mode, 60 Strand Single Mode Fiber (needs 20
breakout kits)
Equal to Berk-Tek, PN# LTR12B120-060EB3010/25-060AB0403

Hybrid 72 Strand Multi Mode, 72 Strand Single Mode Fiber (needs 24

breakout kits)

Equal to Berk-Tek, PN# LTR12B144-072EB3010/25-072AB0403

B. Copper System Backbone Cabling

1. Voice System Backbone Cabling

- Cable shall meet or exceed those specified in RUS Bulletin 1753F-208 (REA PE-89)
- Cables shall be made in the U.S.A.
- Core Construction
 - Conductors: Solid, annealed copper, 24 AWG unless otherwise noted on design documents.
 - Insulation: Dual insulation consisting of an inner layer of foamed polyolefin skin, colored coded in accordance with industry standards
 - Core Assembly: Cables of 25 pairs and less formed by assembling pairs together in a single group. Cables of more than 25 pairs formed by twisted pairs arranged in groups with each group having a color coded unit binder.
 - Filling Compound: The entire core assembly completely filled with ETPR compound, filling the interstices between the pairs and under the core tape.
 - Core Wrap: Non-hygroscopic dielectric tape applied longitudinally with an overlap.
 - Sheath Construction
 - Aluminum Shield: Corrosion protected plastic coated, corrugated 0.008" aluminum tape.
- Jacket: Black, linear low-density polyethylene.
- Color: Voice cable jacket will be BLACK
- **Quantity:** See Drawing for quantity and installation details. The number of 25-pair cable between the MDF and the IDF shall be derived by multiplying the number of pairs serving the individual telephone handsets by 1.25 to the nearest 25-pair increment.
- Part#: Equal to Superior Essex Cable:
 - 25 pair = PN# 09-097-02
 - 50 pair = PN# 09-100-02
 - 100 pair = PN# 09-104-02
 - 200 pair = PN# 09-108-02

2.04 Telecommunication Room

The Telecommunication Room (TR) includes those products that terminate horizontal and backbone cabling subsystems and connect them to the network equipment.

- Patch Cords
- Horizontal Cabling Termination Equipment
- Backbone Cabling Termination Equipment
- Cabinets, Racks, and Enclosures

- Cable Support System
 - A. Patch Cords
 - 1. Copper Patch Cords
 - 1.1 Category 6 and Category 6A Data/Voice TR Patch Cords
 - *OWNER PROVIDED*
 - 1.2 Data to Voice TR Patch Cords
 - *OWNER PROVIDED*
 - 2. Fiber Patch Cords
 - 2.1 Fiber Optic TR Multimode Patch Cords
 - *OWNER PROVIDED*
 - 2.2 Fiber Optic TR Singlemode Patch Cords
 - *OWNER PROVIDED*
 - B. Horizontal Cable Termination Equipment
 - 1. Copper Termination Equipment
 - 1.1 Data Category 6 and 6A Patch Panels
 - Panels shall be made of black 16-gauge steel in 24 port configurations.
 - Panels shall have optional rear cable support bar for strain relief. Cable support bar shall attach to the rear of the patch panel itself without the use of additional fasteners or screws.
 - Panels shall have write-on blocks and port numbers are silk-screened in white.
 - Panels shall provide wiring identification & color code and maintain an in-line, paired punch down sequence that does not require the splitting of conductors from individual cable pairs.
 - The panel shall accept all QuickPort modules and feature white write-on front labels.
 - Panels shall be ANSI/TIA/EIA-568-C.1, C.2 and ISO/IEC 11801 category 6 compliant.
 - Panels shall be UL LISTED 1863 and CSA certified.
 - Panels shall be made by an ISO 9002 Certified Manufacturer.
 - Panels shall be made in the U.S.A.
 - Color: Patch Panel shall be BLACK
 - Quantity: See Drawing for quantity and installation details. The number of patch panels to be supplied shall be derived by multiplying the number of data/voice cables being terminated at the individual TR by 1.25 and providing additional panels in the nearest 24 port increment.
 - Part#:

24-port Category 6 flat patch panel, [LEVITON 49255-L24](#)

INSTALLATION NOTE: When installing the 24-port patch panel, install two together and provide 1U of rack space for equipment installation then two panels, 1U of space, etc. VERIFY WITH OWNER RACK/CABINET LAYOUT PRIOR TO INSTALLATION.

- 1.2 Voice Termination Block (Intercom Backbone and Intercom Devices)
 - Pair Capacity 50
 - Blocks shall be wall mounted.
 - Terminates 22 - 26 AWG (0.81 - 0.41mm) solid insulated cable or 18 - 19 AWG (1.02 - 0.91mm) solid stripped cable
 - Blocks shall have stand-off legs included for all locations; S89 series stand- off bracket
 - Made from High impact flame retardant thermoplastic
 - Height: 254mm (10 in.), width: 86.4mm (3.4 in.), depth: 30.5mm (1.2 in.)
 - Part#: Leviton or equal Termination block, 40066-M50 Mounting bracket, 40089-00D

C. Backbone Cable Termination Equipment

1. Connectors

1.1 Fiber Optic Connectors

- *Anaerobic & Mechanical terminations will not be accepted.*

1.2 Fusion-Fiber Pigtail Fusion Splice Module

- Integrated module adapter bulkhead for 12 or 24 fibers with self-contained splice holders
- Individual compartments provide slack storage and bend radius guides for respective backbone cable, 900µm tight buffer pigtails, and fusion spliced fibers
- 12-fiber color-coded 900µm tight buffer pigtails 1.5m length are pre-loaded in module per specific configuration
- Modular design allows for ease of maintenance of individual spliced fiber and allows for scaling up without impacting existing fibers
- Included accessory kit consists of heat shrink style splice sleeves, tie wraps, and mesh sleeve
- Installs in Leviton's Opt-X rack mount (Ultra, 1000i, and 500i) and wall mount fiber enclosures
- Zirconia ceramic ferrules and sleeves used
- 12-fiber splice module configurations will utilize duplex LC adapters
- 24-fiber splice module configurations will utilize quad LC adapters
- ALL FIBER SHALL BE FUSION SPLICED

- Quantity: See Drawing for quantity and installation details.
- Part #: Leviton or equal
- 12-strand Singlemode, SPLCS-12L
- 24-strand Singlemode, SPLCS-24L
- 12-strand Singlemode Fusion Splice pigtail kit, UPPLC-KIT

2. Fiber Termination Panels

2.1 IDF Rack Mount Fiber Panel

- Fiber panels shall be constructed of durable polycarbonate plastic and black powder-coated 16-gauge steel
- Panel shall have a sliding tray which removes completely from enclosure to facilitate field terminations and splicing
- Sliding tray with front and rear stop shall glide forward and backward providing accessibility to front and rear of bulkhead after installation
- Panel shall have a 17" depth for high-density fiber termination and/or splicing
- Front saddles shall pivot for improved patch cord routing and organization
- Removable transparent hinged doors and slide-away covers shall allow for easy access during install and visibility of interior after install
- Panel shall employ patch cord bend radius guides to minimize macro bending
- Stackable and adjustable fiber rings simplify cable management
- Panel shall be no more than 1 rack unit in height and shall hold up to 3 adapter plates.
- Panel shall be Made in the U.S.A
- ALL FIBER SHALL BE FUSION SPLICED
- COLOR: black with translucent blue cover panels
- Quantity: See Drawing for quantity and installation details.
- Part#: Leviton Opt-X SDZ 2000i no exceptions
1U - 5R1UH-S03

2.2 IDF Wall Mount Fiber Enclosure

- Panels shall be constructed of cold rolled 16 gauge steel with a black powder paint finish and provide for fully enclosed fiber termination.
- Panel shall have a door design. One door shall be lockable for the "technician side" that secures the incoming and outgoing fiber cables. The second door shall accessible to provide fiber patching as needed.
- Panels shall accept four adapter panels for 24 port configurations.
- Panels shall have a splice tray mounting stud incorporated into the base for mounting of mechanical or fusion splice trays. Panel shall have cable management anchor points and come with cable anchors allowing for the maintenance of the incoming cable with

- the proper minimum bend radius.
 - Panels shall have cable entrance ports on the top and bottom with removable plastic dust covers.
 - ALL FIBER SHALL BE FUSION SPLICED
 - Color: Fiber Panel will be BLACK
 - Quantity: See Drawing for quantity and installation details.
 - Part: 5W [MED-04C](#), [5L000-KAL](#)
- 2.3 MDF Rack Mount Fiber Panel
- Fiber panels shall be constructed of durable polycarbonate plastic and black powder-coated 16-gauge steel
 - Panel shall have a sliding tray which removes completely from enclosure to facilitate field terminations and splicing
 - Sliding tray with front and rear stop shall glide forward and backward providing accessibility to front and rear of bulkhead after installation
 - Panel shall have a 17" depth for high-density fiber termination and/or splicing
 - Front saddles shall pivot for improved patch cord routing and organization
 - Removable transparent hinged doors and slide-away covers shall allow for easy access during install and visibility of interior after install
 - Panel shall employ patch cord bend radius guides to minimize macro bending
 - Stackable and adjustable fiber rings simplify cable management
 - Panel shall be 2 or 4 rack units in height and shall hold up to 6 or 12 adapter plates, respectively
 - Panel shall be Made in the United States
 - ALL FIBER SHALL BE FUSION SPLICED
 - COLOR: black with translucent blue cover panels
 - Quantity: See Drawing for quantity and installation details.
 - Part#: Leviton Opt-X SDX 2000i no exceptions
2U - 5R2UH-S06
4U - 5R4UH-S12
- 2.4 Premise Splice Enclosures – Portable Classroom Distribution
- Modular wall-mount enclosures used to directly splice outside plant or intra- building cables
 - Four fusion/mechanical splice trays; 4" Standard Splice Tray, 4" x 11.75" x 0.25" # [T54LHS-P06](#)
 - Constructed of cold-rolled steel
 - ALL FIBER SHALL BE FUSION SPLICED
 - CPS-24, Customer Premise Splice Enclosure, empty (2 tray capacity)
 - Part#: [5WMED-04C](#)
- 2.5 Fiber Optic Adapter Plates
- The Fiber adapter plate shall precision molded and compatible

- with all approved panels and enclosures (rack- or wall-mount).
- The adapter plate shall be offered in LC style in 12 or 24 fiber configurations per plate.
- The adapter plate shall be compliant to TIA-568-C.3 (for performance) and respective TIA-604-X (for intermateability) standards.
- Adapter plates shall use zirconia ceramic sleeves and be offered in standard fiber type colors pursuant to TIA-568-C.3 standards.
- The adapter and plate shall be integrated using precision-molded injection manufacturing methods, to eliminate “rattle” and loose fit.
- Adapter plates shall be made in the United States of America.
- Meets TIA-604-10B (LC) for connector intermateability
- ALL FIBER SHALL BE FUSION SPLICED
- COLOR: Aqua for Multimode, Blue for Singlemode, Black for blank plates
- Part #:
 - 6-port Duplex LC MM Adapter Panel, 5F100-2QL
 - 6-port Duplex LC SM Adapter Panel, 5F100-2LL
 - Blank Adapter Panel, 5F100-PLT

2.6 Fiber Optic OSP Splice Enclosures

- Used to directly splice outside plant or intra-building cables.
- Accommodates various splice tray designs, Maximum Capacity: 96 single fibers using 5" x 7" and 4" x 7" trays
- Enclosure made from 16-gauge steel, Hinges shall be Stainless steel
- Two-year limited product warranty.
- Durable powder-coat finish COLOR: Beige
- Size 16" x 15" x 3.4"
- ALL FIBER SHALL BE FUSION SPLICED
- Part #: Leviton CPS Customer Premise Splice Enclosure, Single Door, 24 Fiber Trays # CPS24-STD
Injection Molded Mini Splice Tray, Heat Shrink style (accepts standard sleeves), up to 12 fiber splicing # T5PLS-12F
Splice Tray Mounting Hardware Kit # SPLMT-HKT Splice Sleeve, 40 mm # FSSSD-040
Cable clamp kit # [5RCMP-KIT](#)
Grounding kit # [DPGRD-KIT](#)
Key Locking kit # [5L000-KAL](#)

3. Copper Termination Panels

3.1 OSP Protection Panels (Intercom Backbone Headend)

- 16 AWG Powder Coated Steel Construction
- Equipped with an Internal 26 AWG Fuse Link
- External Ground Connectors Accept 6 - 14 AWG Wire
- Industry Standard 5 Pin Design
- Exceeds UL497 Primary Protection Standards

- Stackable with Connection Grommets Included
- 66 Block Accepts 22 - 26 AWG Wire/18 - 19 AWG Stripped Solid Copper Wire
- Color: NA
- Quantity: See Drawing for quantity and installation details.
Part#: Circa Enterprise inc.
25 pair block, PN# 1890ECT1-25
50 pair block, PN# 1890ECT1-50
100 pair block, PN# 1890ECT1-100

3.2 OSP Protection Fuses

- 240VDC (RUS Approved)
- Nanosecond response time
- External failsafe mechanism that permanently carbon arrestors grounds the module under sustained high current conditions
- Integrated Test Points
- UL & cUL listed
- Designed to meet or exceed Telcordia standards
- ISO 9002 Certified Manufacturer
- Color: RED
- Quantity: See Drawing for quantity and installation details.
Part#: Circa Enterprise inc. 4B1SF-240
**Provide 100% fuse density for all installed Protection Panels.*

3.3 Voice Termination Block (Intercom Backbone building/TC and Intercom Devices)

- Pair Capacity 50
- Blocks shall be wall mounted.
- Terminates 22 - 26 AWG (0.81 - 0.41mm) solid insulated cable or 18 - 19 AWG (1.02 - 0.91mm) solid stripped cable
- Blocks shall have stand-off legs included for all locations; S89 series stand- off bracket
- Made from High impact flame retardant thermoplastic
- Height: 254mm (10 in.), width: 86.4mm (3.4 in.), depth: 30.5mm (1.2 in.)
- Part#: Leviton 66-Style Termination block, 40066-M50 Leviton 66-Style Mounting bracket, 40089-00D

D. Cabinets, Racks, and Enclosures

Contractor will provide the following 'HC' Enclosures and components based on the number of cables to that will be terminated:

1. Cabinets:

- Wall-mounted cabinets shall be manufactured from steel sheet.
- Each cabinet will have a rear panel that attaches to the wall, a hinged cabinet body that swings open from the rear panel providing easy access

to the rear of equipment and a locking front door.

- The rear panel will provide cable access with pre-punched knockouts, up to 3", for conduit along the top and bottom edges of the panel. There will also be cutouts in the back of the rear panel so that cables can enter the panel through the wall. The rear panel will provide attachment points for accessory equipment mounting brackets and cable tie points within the panel (cabinet).
- The cabinet body will include a single pair of vertical 19" EIA equipment mounting rails. The mounting rails will be EIA-310-D compliant with the Universal hole pattern. Mounting holes will have #12-24 threads.
- Mounting rails will be adjustable in depth so that they can be positioned at any point within the cabinet body. The design of all cabinets will allow an additional pair of mounting rails (for a total of two pairs of mounting rails per cabinet) to be added to the cabinet.
- The wall-mount cabinet shall provide a hinge design that attaches the cabinet body and the rear panel and allow the rear panel to be removed during installation. The hinge design will allow the cabinet body to open at least 90°. The hasp used to secure the rear panel and the cabinet body together will assist in drawing the components together during the locking action.
- The cabinet body will include vents that are designed to accept fan kits.
- The front door will be hinged and locking. The front door and rear panel will be keyed alike. The front door will have rounded edges and corners. The cabinet body will allow the front door to be attached so that it will swing open from the right or left. The cabinet manufacture shall provide an option for a solid or a tinted plexi-glass window front door. The plexi-glass in doors shall be bronze acrylic (not clear) with a UL flammability classification of 94HB or better.
- Finish shall be epoxy-polyester hybrid powder coat (paint).
- The cabinet shall have the option of being delivered fully assembled. All cabinets will include installation hardware (hex lag screws) for wood studs and 50 each #12-24 equipment mounting screws.
- Load bearing capacity for cabinets that wall-mount will be a minimum of 200 pounds per cabinet.
- Cabinets that are wall-mount only will be certified and UL Listed to standard UL 60950 under category NWIN.
- CONTRACTOR TO INSTALL PROFESSIONALLY SO OWNER PROVIDED EQUIPMENT FITS IN THE RACK. VERIFY RAILS ARE PROPERLY ALIGNED SO ALL EQUIPMENT FITS (including UPS, Network equipment, cables, cords, power strip, etc.) AND DOORS CLOSE. VERIFY SPACING BETWEEN PANELS IS ADEQUATE FOR EQUIPMENT INSTALLATION. VERIFY WITH OWNER CABINET LAYOUT FOR PATCH PANELS, ETC BEFORE INSTALLATION.
- Color: Wall Mount Cabinet will be BLACK
- Quantity: See Drawing for size, quantity and installation details.
- Part#:

Wall Mount Cabinet

18U Cabinet equal to Chatsworth Products, PN# 11900-736 26U Cabinet

equal to Chatsworth Products, PN# 11900-748

**Contractor will provide an additional set of mounting rails for each wall mount cabinet, equal to Chatsworth Products PN# 12787-5xx.*

Wall/Floor Mount Cabinet

33U Cabinet equal to Chatsworth Products, PN# 13495-760 40U Cabinet equal to Chatsworth Products, PN# 13495-772

**Contractor will provide an additional set of mounting rails for each wall mount cabinet, equal to Chatsworth Products PN# 13276-7xx.*

Fan Kit/Filter Kit

Equal to Chatsworth Products Fan Kit, PN# 12804-701 Equal to Chatsworth Products Filter Kit, PN# 12805-701 Grounding Kit

Equal to Chatsworth Products, PN# 10610-019 Power Strip with Surge Suppression

Leviton 5500-192

2. Floor Mount 2-post Racks

- Each rack shall have two L-shaped top angles, two L-shaped base angles and two C-shaped equipment-mounting channels. The rack shall assemble with nut and bolt hardware. The base angles shall be pre-punched for attachment to the floor.
- Equipment mounting channels shall be 3" (76 mm) deep and punched on the front and rear flange with the EIA-310-D Universal hole pattern, 1-3/4" (44.45 mm) rack-mount spaces (U), to provide 45U, 52U or 58U for equipment. Each mounting space (U) shall be marked and numbered on the mounting channel.
- When assembled with top and bottom angles, equipment-mounting channels shall be spaced to allow attachment of 19" EIA rack-mount equipment. Equipment attachment points shall be threaded with 12-24 roll-formed threads. The rack shall include assembly and equipment-mounting hardware. Racks shall include 50 each combination pan head, pilot point mounting screws.
- The assembled rack shall measure 7' (2.1 m)/84" (2133 mm) high, 8' (2.4 m)/96" (2438 mm) high or 9' (2.7 m)/108" (2743 mm) high; 20.3" (515.9 mm) wide and 15" (381.0 mm) deep. The sides (webs) of the equipment-mounting channels shall be punched to allow attachment of vertical cable managers along the sides of the rack or for rack-to-rack baying.
- Assembly hardware shall electrically bond the top angles, side channels and base angles together when assembled, and there shall be a masked ground attachment point with 1/4-20 threaded studs spaced 5/8" apart on the inside of the side channel to attach a ground lug allowing easy attachment to the Telecommunications Ground.
- The rack shall be rated for 1,000 lb (453.6 kg) of equipment.
- Certifications: Communications Circuit Accessory, DUXR and DUXR7 category, file number 140851
- Material: Steel and aluminum extrusion
- Construction: Bolted assembly, Ships unassembled
- **VERIFY RACK LAYOUT WITH OWNER PRIOR TO INSTALLATION.**

- Color: BLACK
- Quantity: See Drawing for quantity and installation details.
- Part#: Chatsworth Products Inc.
Floor Mount 2-Post Rack
CPI# 55053-703
Vertical Wire Managers
Equal to Leviton, PN# 8980L-VFR
Power Strip with Surge Suppression
Leviton 5500-192

3. Floor Mount 4-post Racks

- Four-post frame with threaded mounting holes used to support 19" wide rack- mount communications equipment and shelves
- For indoor use only, in environmentally controlled areas; may not be used outdoors, in industrial or harsh environments, or in plenum spaces
- Includes: (1) top pan, (1) bottom pan, (4) mounting channels, (2) base angles, (2) top angles
- Assembly hardware; (100) #12-24 equipment mounting screws
- Equipment Support: Front and rear pairs of 3" deep C-shaped equipment mounting channels, Fixed in place, 29" apart front-to-rear, 19" wide, EIA-310- D compliant hole pattern
- 1-3/4" high rack-mount units (RMU); RMU spaces are marked and numbered on the channels
- Universal hole pattern, 5/8"-5/8"-1/2" vertical hole spacing
- Threaded #12-24 equipment mounting holes, Includes 100 each #12-24 equipment mounting screws
- Load capacity: 2000 lb of equipment
- Material:; Aluminum extrusion, Aluminum sheet
- Construction: Bolted assembly, Ships unassembled
- VERIFY WITH OWNER RACK LAYOUT PRIOR TO INSTALLATION.
- Color: BLACK
- Quantity: See Drawing for quantity and installation details.
- Part#: Chatsworth Products Inc.
Floor Mount 4-Post Open Frame Rack CPI# 15053-703
Grounding Kit 10610-019
Power Strip with Surge Suppression Leviton 5500-192

4. Floor Mount Cabinets

- Four-post frame with threaded mounting holes used to support 19" wide rack- mount communications equipment and shelves
- For indoor use only, in environmentally controlled areas; may not be used outdoors, in industrial or harsh environments, or in plenum spaces
- Includes: (1) top pan, (1) bottom pan, (4) mounting channels, (2) base angles, (2) top angles

- Assembly hardware; (100) #12-24 equipment mounting screws
- Equipment Support: Front and rear pairs of 3” deep C-shaped equipment mounting channels, Fixed in place, 29” apart front-to-rear, 19” wide, EIA-310- D compliant hole pattern
- 1-3/4” high rack-mount units (RMU); RMU spaces are marked and numbered on the channels
- Universal hole pattern, 5/8”-5/8”-1/2” vertical hole spacing
- Threaded #12-24 equipment mounting holes, Includes 100 each #12-24 equipment mounting screws
- Load capacity: 2000 lb of equipment
- Material: Aluminum extrusion, Aluminum sheet
- Construction: Bolted assembly, Ships unassembled
- VERIFY WITH OWNER CABINET LAYOUT PRIOR TO INSTALLATION.
- Color: BLACK
- Quantity: See Drawing for quantity and installation details.
- Part#: Chatsworth Products Inc.
Floor Mount Cabinet CPI# M1050-741
Grounding Kit 10610-019
Power Strip with Surge Suppression Leviton 5500-192

5. Outdoor Wireless Access Point Enclosure

- Non-glass-filled polyester material, UV resistance; Overlapping tongue-and-groove raised cover and gasket provide secure Type 4X seal
- Removable snap-hinge cover allows for easy access to cover and body for modifications
- Molded layout grid on inside of body and solid covers assists with component mounting
- Molded-in embosses for rear panel mounting
- Internal rail system and adjustable panel blocks allow
- UL 508A Listed, NEMA/EEMAC Type 4
- Material: Non-glass-filled polyester
- Color: Light-Gray
- Quantity: See Drawing for quantity and installation details.
- Part#: Pentair
- Polypro Wifi, PN# D16148WF

E. Cable Support System

1. Ladder Rack Cable Runway

- Stringers shall be fabricated from 16ga .375” x 1.5” Cold Rolled Steel tubing.
- Rungs shall be fabricated from 16ga .5” x 1.0” Cold Rolled Steel tubing
- Rungs shall be spaced at 9.0” center to center
- A straight length of ladder shall be capable of supporting 45 pounds per foot when a 10’ length is tested according to NEMA VE-1.
- Ladder Rack shall have a powder coat finished.

- Ladder Rack shall be available in standard 6ft. and 10ft. lengths.
- Ladder rack shall be a part of a total system that includes: manufacture bends, wall supports, joining hardware, etc.
- Ladder Rack shall be grounding per the TIA/EIA 607-A.
- Color: Ladder Rack will be BLACK
- Quantity: See Drawing for quantity and installation details.
- Part#: Equal to Chatsworth Products Cable Raceway, PN# 11252-71X

PART 3 – BACKBONE SLACK LOOPS

- Storage rings may be used to store coiled slack loops on backboard.
- Part #:
Fiber storage rings, Indoor fiber: 48900-IFR
Fiber storage rings, Outdoor fiber: 48900-OFR

PART 4 – EXECUTION

4.01 INSTALLATION

A. Work Area Outlets Installation

- No more than 12” of cable shall be stored in an outlet box, modular furniture raceway, or insulated walls.
- Bend radius of the cable in the termination area shall not be less than 4 times the outside diameter of the cable.
- The cable jacket shall be maintained to within 12.7mm (½ inch) of the termination point.
- All UTP cables shall have no more than 6.4mm (1/4 inch) of pair *untwisted* at the termination point.
- Data jacks, unless otherwise noted in drawings, shall be located in the top position(s) of each faceplate. Data jacks in horizontally oriented faceplates shall occupy the left-most position(s).
- Voice jacks, unless otherwise noted in drawings, shall occupy the next position(s) below the data on the faceplate. Voice jacks in horizontally oriented faceplates shall occupy the position left of the data jack.
- Video jacks, unless otherwise noted in drawings, shall occupy the bottom position(s) on the faceplate. Video jacks in horizontally oriented faceplates shall occupy the position left of the data/voice jack.
- All faceplates installed shall be level.
- All outlets will be labeled according to the approved labeling scheme.
- Each faceplate shall be machine labeled. The labeling shall be placed on the faceplate so that the individual jack can be clearly identified by its associated label.
- Cables shall be identified by a self-adhesive label in accordance with the Identification and Labeling section of this specification and ANSI/TIA/EIA- 606. The cable label shall be applied to the cable no further than 6” behind termination module, behind the faceplate on a section of cable that can be accessed by removing the cover plate.

B. Horizontal Distribution Cable Installation

- Cable shall be installed in accordance with manufacturer's recommendations and best industry practices.
- Nylon or plastic locking cable ties, e.g. "Zip-Ties", shall not be used on this project.
- Contractor will provide at least a three foot "service loop" for all station cables. The service loop will be coiled and secured using Velcro in the accessible ceiling at the conduit stub to the work area outlet box.
- Tie Wraps will not be allowed for supporting, bundling and/or dressing of any station cables on this project.
- Contractor will provide at least a three foot "service loop" for all station cables. The service loop will be coiled and secured using Velcro in the accessible ceiling at the conduit stub to the work area outlet box.
- A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in all "common" conduit runs. "Common" Conduit Runs are those that house more than one cable or set of cables that do not specifically feed a Work Station Outlet. Examples of "Common" Conduit Runs are: floor/ceiling penetrations, stub-throughs, distribution conduits, all conduits between J- boxes, etc.
- Cable raceways shall not be filled greater than the Owner's 40% fill ratio. Contact Owner as needed to understand the Owner's fill ratio requirement.
- Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.
- The cable's minimum bend radius and maximum pulling tension shall not be exceeded.
- Pulling tension on 4-pair UTP cables shall not exceed 25-lb for a four-pair UTP cable.
- The Cable Support System shall be installed in such a way that will allow for future cables to be added and to provide sufficient protection of all cable.
- For all installs where station cables are not installed in a continuous conduit run the following guidelines will apply. The Contractor will be responsible to reinstall all cables and pathways that do not meet with the following at no additional cost to the Owner:
 - J-hooks shall be installed to support all station cables every 14" – 28" inches.
 - All pathways shall be run at right angles. No diagonal pathways will be allowed unless otherwise noted on the drawings.
 - Horizontal cables shall be bundled in groups of no more than 25 cables per Caddy's CAT21 J-hook, no more than 40 cables per Caddy's CAT32 J-hook, and no more than 64 cables per Caddy's CAT64 J-hook.
 - A separate J-hook is used for each group of cable. Specifically, CAT6 cable, fiber cable, and fire alarm are to have their own J-hook.
 - At no point shall cable(s) rest on acoustic ceiling grids, acoustic panels, or lighting fixtures.
 - All cables will be installed so that there is a minimum of 3" of clearance above all ceiling grid and tiles.
 - All cables will be installed so that there is a minimum of 12" of clearance above all florescent lighting.
 - All cables will be installed so that there is a minimum of 6" of clearance from all fire alarm and electrical system conduits.

- Cables shall not be attached to the ceiling grid or lighting fixture wires. The contractor will provide their own carriers wires to support their horizontal cabling.
- All cables shall be installed above fire-sprinkler systems and plumbing system fixtures and devices. Cables shall not be attached to or supported by these fixtures and/or their ancillary equipment or hardware.
- The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.
- Contractor is responsible for sealing around all cables that penetrate fire rated barriers.
- Wireless and overhead cables shall be secured by an in-ceiling mounting bracket affixed to its dedicated ceiling wire or mounted to building structure.
- Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.

C. Horizontal Cross-Connect Installation

- Cables shall be cleaned, dressed, and terminated in accordance with the recommendations made in the TIA/EIA-568-A standard, manufacturer's recommendations and best industry practices. Contractor to verify standard network equipment can be installed without any interference from the cables. Equipment typically is installed directly above and/or below the panel.
- The cable jacket shall be maintained to within 12.7mm (½ inch) of the termination point.
- All UTP cables shall have no more than 6.4mm (¼ inch) of pair untwist at the termination point.
- Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.
- All cables shall be neatly bundled in groups of 24 and dressed continuously from the entrance point of the Telecommunications Room to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame. Contractor will use Velcro strip to bundle cables together. The use of Tie –Wraps is not permitted.
- Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

D. Backbone Cable Installation

- Backbone cables shall be installed separately from horizontal distribution cables.
- Each individual cable is to be labeled. See details sheets for labeling examples. Cable type, installation date, and from/to are required. Each cable to be labeled at any accessible point, including, but not limited to, pull boxes, Christy boxes, junction boxes, and any pass through location.
- Where possible the backbone and horizontal cables shall be installed in separate

conduits.

- Where possible backbone cables of the same type shall be combined in conduit runs to maximize conduit fill ratios.
- Where backbone cables and distribution cables are installed in a cable tray or wireway, backbone cables shall be installed first and bundled separately from the horizontal distribution cables.
- Pulling tension on Backbone cables shall not exceed the manufacture's limitations.
- The minimum bend radius for all Backbone cables is 16 times the cable diameter or the manufactures specification, whichever is greater.
- Cable slack shall be provided in every pull box, junction box, cabinet, entry facility, telecom room and termination enclosure.
 - 25 feet of slack per cable shall be mounted on a service ring inside the enclosure.
 - All cable shall be installed such that all cable is above the bottom of the enclosure. All cable shall be suspended on cable support hooks around the perimeter of the enclosure. Cable Support Hooks equal to Hubbell Power Systems PN# C2031124 and C2031133 (part numbers dependent on size of enclosure, sample part numbers only, not to be used in all circumstances).
 - Entry & telecom rooms & cabinets: Minimum 25' feet coiled in re-closeable storage ring.
 - If 25' is not possible, contact the owner and discuss an agreeable amount of slack, followed up with an confirming RFI.
 - Minimum of 25' of slack in each vault and a minimum of 15' of slack in any other type of box (pull box, Christy box, pass through space, etc).
- All OSP cables may not penetrate more than 50ft into the buildings before be terminated or splices to cable with a fire resistant jacket, unless the jacket is indoor/outdoor rated.
- A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.
- All backbone cables shall be securely fastened to the sidewall of the TR on each floor.
- Backbone cables spanning more than three floors shall be securely attached at the top of the cable run with a wire mesh grip and on alternating floors or as required by local codes.
- Vertical runs of cable shall be supported to messenger strand, cable ladder, or other method to provide proper support for the weight of the cable.
- Large bundles of cables and/or heavy cables shall be attached using metal clamps and/or metal banding to support the cables.

E. Backbone Cross-Connect Installation

- Cables shall be cleaned, dressed, and terminated in accordance with the recommendations made in the TIA/EIA-568-C document, manufacturer's recommendations and best industry practices.
- Bend radius of the cable in the termination area shall not exceed 16 times the outside diameter of the cable.
- All cables shall be neatly bundled and dressed continuously from the entrance point of the Telecommunications Room to their respective panels or blocks.

- Contractor will provide a minimum of a 3 foot “service loop” for each backbone cable before terminating to allow future rearrangement. Cables will be coiled and secured above the ceiling where possible or to the Telco Backboard where entrance point is from the floor.
- Wall mounted termination block fields shall be installed with the lowest edge of the mounting frame 18” from the finished floor.
- Contractor shall provide a machine label 1ft. to 2ft. from the entrance point of the TR and 6in. to 12in. from the termination point on each backbone cable. Cable shall be easily identified and fully legible without removing the bundle support ties.

F. Cabinets, Racks, Enclosures and Ladder Rack Installation

- Wall Mount Racks/Cabinets shall be securely attached to the Telco Backboard using minimum 5/16” hardware or as required by local codes. Mounting rails shall be adjusted to the proper depth to allow for the closing of doors when populated with network electronics. Coordinate with Owner for final depth required.
- Floor Mount Racks/Cabinets shall be securely attached to the concrete floor using minimum 3/8” drop-in anchor hardware or as required by local codes.
- All Floor Mount Racks/Cabinets will be either; secured on one side to the wall or attached to the closest wall with ladder rack.
- All Racks/Cabinets shall be braced to meet Zone 4 seismic requirements.
- Contractor will maintain a minimum of 36 inches of clearance from the front of the all rack/cabinets and all other obstructions.
- Floor Mount Racks/Cabinets shall be installed to allow for a minimum of 36” from rear and all other obstructions.
- All racks shall be grounded to the telecommunications ground bus bar.
- Rack mount screws not used for installing patch panels and other hardware shall be bagged and left with the rack upon completion of the installation.
- The plywood bottom edge shall be mounted vertically no less than 12” above the finished floor.
- Contractor will provide all cutouts for the Electrical Contractors expansion rings and electric receptacles as shown on the drawings.
- Ladder Rack must be securely attached to walls, backboards, and racks/cabinets to comply with all Zone 4 seismic requirements.
- Ladder rack shall be installed so that there is a minimum of 8” of unobstructed clearance above rack.
- Ladder Rack shall be installed so that there is a minimum of 12” of clearance from all: florescent lighting, electrical conduits/circuits, and fire alarm conduits/devices.

4.02 IDENTIFICATION AND LABELING

- A. The labeling scheme for CAT6 cable is as follows for classrooms (verify with Owner prior to printing the labels):
- B. When entering the room (if the room has multiple doors, the door designated as the primary entry door), label numbering shall start a one (1) and then increment as data drops are added going around the room, then any drops in the ceiling, and then any drops i

n the floor. For each room, numbering starts over at one (1). Each jack color starts at one (1) and increments for each additional jack of the same color. Label designations are based on jack color:

Blue = D#
White = V#
Yellow = W#
Gray = A#
Purple = C#
Green = L#

Patch Panel Label Format: RM# - _____

The first part of the label shall be the room number the data drop is located in, RM is part of the label, followed by the room number or room designation. The last part of the label shall be the type, as stated above based on jack color, then followed by the drop number. For example, RM3-D10 is room 3, data drop 10. RM3-V2 would be room 3, voice data drop 2.

The label format in the room: RM# - ____ - _____

The first part of the label shall be RM, followed by the room number/ designation the cabinet/rack is located in.

The second part of the label shall be the patch panel the cable is terminated on. The top most panel is A and continues down with B, C, etc... If multiple panels span more than one rack/cabinet, when standing in front of the rack/cabinets, the top left panel shall be A. The last part of the label uses the label based on jack color, as stated above, and the drop number. Example, RM3-A-D10: Indicates the other end of the cable is in the cabinet/rack in room 3, terminated on panel A, and the last portion, ie D10 in this example, was the tenth data drop in this room. The last portion, D10 in this example, would match the patch panel label, RM3-D10. Label scheme for non-classroom buildings follows the above scheme, but the label number starts at 1 (one) for each type (D, V, W, A, C) and increments throughout the building and does not reset for each room/office. Start at one and do not repeat the number anywhere in the building (for each type).

- C. The approved system will comply with the TIA/EIA -606-A Class 2 designations and include at a minimum, identifiers for all major components of the system: telecommunication rooms, grounding bus bars, racks, cables, panels and outlets. The labeling system shall designate the cables origin and destination and a unique identifier for the cable within the system. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure.
- D. All label printing will be machine generated or hand-held printers using indelible ink ribbons or cartridges. Self-laminating labels will be used on cable jackets, appropriately sized to the OD of the cable, and placed within view at the termination point on each end. Outlet, patch panel and wiring block labels shall be installed on, or in, the space provided on the device.
- E. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme.

- F. All fiber cable labels are to include the type, count, from and to on each label. Any point the fiber is accessible shall be labeled. At a minimum, that would include the starting point, any Christy boxes, cabinets/racks, any rooms the cable passes through, and the ending point. Service loops provided and labeled at each location, a minimum of 25' in each vault and 15' minimum in a Christy box/any other box or pass through space.
- G. Labels are to verified by Owner prior to printing. Labels are to include building/room designations used by the site. Do NOT use building/room designations from the plans unless approved by Owner in writing.
- H. Fiber optic cable labels are to verified by Owner prior to printing and include:
CABLE TYPE
FROM TO
DATE INSTALLED
For example:
Single Mode – 36 Count MDF IDF in Room XX INSTALLED: JULY 2017

4.03 TESTING AND ACCEPTANCE

- A. General
 - 1. The Owner reserves the right to be present during any & all types of tests being performed.
 - 2. Contractor will notify the Owner/Owner's Representative 24 hours before commencement of testing.
 - 3. Upon receipt of the test documentation, the Customer reserves the right to have the contractor perform a 10% witnessed "spot testing" of the cabling system to validate test results provided in the test document, at no additional cost. If a significant amount of cables are marginal and/or fail during the "spot test" Contractor will retest the entire cable plant at no additional cost.
 - 4. Contractors shall provide proof of test equipment calibration prior to testing.
 - 5. Test equipment shall have been factory calibrated within six months of project testing dates.
 - 6. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of TIA/EIA-568-C, TSB-67 and TSB-95. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.
 - 7. All cables shall be tested in accordance with this document, the ANSI/TIA/EIA standards, the Manufacturer's Warranty guidelines and best industry practice. If any of these are in conflict, the Contractor shall bring any discrepancies to the attention of the project team for clarification and resolution.

8. Test results are required to be sent to Owner in PDF format and in FLW format. IF there are an unusual amount of cables that passed marginal, as indicated by the tester, Contractor to re-terminate all cables and re-test.

B. Copper Cable Testing

1. Twisted Pair Cable

- All twisted-pair copper cable links (including backbone cables) shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below.
- Continuity - Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity and pair-reversals, crossed pairs and split pairs. Shielded/screened cables shall be tested with a device that verifies shield continuity in addition to the above stated tests. The test shall be recorded as pass/fail as indicated by the test unit in accordance with the manufacturers' recommended procedures, and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to final acceptance.
- Cables that are passed by the tester but marked as marginally passed, typically indicated by an asterisk (*), may be required to be re-terminated and re-tested by Owner if there are an unusually high percentage of cables that were marginally passed by the tester. Unusually high is determined by Owner.
- Length - Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the ANSI/TIA/EIA-568-A Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the shortest pair length shall be recorded as the length for the cable.

2. Category 6 Performance

- Follow the Standards requirements established in:
 - ANSI/TIA/EIA-568-C.0 Wire Map
Length
Attenuation
NEXT (Near end crosstalk)
 - ANSI/TIA/EIA-568-C.2 Return Loss
ELFEXT Loss Propagation Delay Delay skew
PSNEXT (Power sum near-end crosstalk loss) PSELFEXT
(Power sum equal level far-end crosstalk loss)
- A Level III or better test unit is required to verify category 6 performances and must be updated to include the requirements of TSB-95 and Amendment 5. Testers will be equal to or better than Fluke Network's Versiv DSX CableAnalyzer.

- All testers shall have been recalibrated within 6 months of use on this project. Contractor will be asked to provide proof of recalibration.
- Test results shall be automatically evaluated by the equipment, using the most up-to-date criteria from the TIA/EIA Standard, and the result shown as pass/fail. The approved Level Three tester shall provide a printed document for each test that is also available in a downloadable file using an application from the test equipment manufacturer. The printed test results shall include a print out of all tests performed, and the individual test results for each cable. A PDF of the test results and the Fluke FLW File are required to be sent to Owner for review.

3. Category 6A Performance

- Shall meet all test parameters as stated above for Category 6, with the addition of PSANEXT, PSAACR, and PSAACR-F:

C. Fiber Optic Cable Testing

1. Backbone Fiber

- Each fiber strand shall be tested for attenuation with an Optical Power Meter and light source and with an Optical Time Domain Reflectometer (OTDR) for actual length and splice/connector loss. Cable length shall be verified using sheath markings. The guidelines and procedures established for Tier 1 testing in TIA/TSB-140 shall apply.
- All fiber optic cables shall be tested from the site's MDF to each fiber terminals located in the IDF. The results of OTDR testing to define the length of each riser cable shall be documented. The Contractor shall conduct a power meter (loss) test of each fiber optic station and riser cable at both wavelengths, 850/1300nm for MM and 1310/1550nm for SM, A to B, B to A, and OSPL (OSPL is defined as $L_a + L_b$). No individual station or riser fiber link segment (including connectors) shall measure more than 2.0 dB loss. Tests shall be conducted using ANSI/EIA/TIA/EIA-526-14A, Method B. Test results evaluation for the panel to panel (backbone) shall be based on the values set forth in ANSI/TIA/EIA-568-C.2. The Contractor shall provide an electronic printout for each strand tested with the Power Meter and the OTDR.
- Where concatenated links are installed to complete a circuit between devices, the Contractor shall test each link from end to end to ensure the performance of the system. After the link performance test has been successfully completed, each link shall be concatenated and tested. The test method shall be the same used for the test described above. The evaluation criteria shall be established between the Owner and the Contractor prior to the start of the test.
- All installed cables must meet or exceed the defined standards for performance. The Contractor shall take all steps necessary to repair or replace any optic not meeting the standard.
- Fiber optic riser and station cable test results shall be provided in electronic format to the Owner. PDF and Fluke FLV files are to be sent to Owner.

4.04 SYSTEM CLOSEOUT AND AS-BUILT DOCUMENTATION

- A. Upon completion of the installation, the telecommunications contractor shall provide three (3) full documentation sets to the Owner's Representative/Engineer for approval. One (1) to be a hardcopy and two (2) to be electronic copies. Documentation shall include the items detailed in the sub-sections below.
- B. Documentation shall be submitted within ten (10) working days of the completion of each testing phase. This is inclusive of all test results and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 calendar days of the completion of each testing phase. At the request of the Owner's Representative/Engineer, the telecommunications contractor shall provide copies of the original test results.
- C. The Owner's Representative/Engineer will request that a 10% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the telecommunications contractor, additional testing can be requested to the extent determined necessary by the Engineer, including a 100% re-test. This re-test shall be at no additional cost to the Owner.
- D. Test Results documentation shall be provided in two media, as listed above, one (1) hardcopy and one (1) on USB within three weeks after the completion of the project. The documentation shall be clearly marked on the outside front cover with the words "Project Test Documentation", the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, a bi-annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.
- E. Printouts generated for each cable by the wire test instrument shall be submitted as part of the documentation package.
- F. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.
- G. The As-Built drawings are to include cable routes, outlet locations and the approved labeling identifiers. Their sequential number as defined elsewhere in this document shall identify outlet locations. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. These documents will be modified accordingly by the telecommunications contractor to denote as-built information as defined above and returned to the Owner.
- H. Contractor will provide one laminated 11"x17" drawing at each IDF that includes the building layout for that IDF, along with the outlet locations and all of the approved labeling. The as-built/current layout is to be provided.

- I. Test results are to be submitted to the manufacturer and a copy of the warranty certification is to be provided to the owner.

Sample Rack Layout in IDF:

Top of unit: Fiber distribution unit(s) Blank 1U.

24-port patch panel 24-port patch panel

Owner provided network switch (installed by Owner) 24-port patch panel

24-port patch panel

Owner provided network switch (installed by Owner) Repeat the pattern:

panel/panel/switch/panel/panel at the bottom on the cabinet, skip 1U above the bottom and the UPS is installed. 1U above the UPS, the power strip is installed.

END OF SECTION

SECTION 27 51 13 – NOTIFICATION PAGING & CLOCK SYSTEMS

PART 1 – GENERAL

1.1 RELATED SECTIONS:

- A. Section 26 05 00 – Common Work Results for Electrical
- B. Section 27 00 00 – Communications

1.2 REFERENCES:

- A. The system shall be listed as a Power Limited Device and be listed under the standards in this section. Each system shall be supplied with complete details on all installation criteria necessary to meet all the listings.
- B. California Code of Regulations
 - 1. Title 24, Part 3 – California Electrical Code
- C. National Fire Protection Association (NFPA)
 - 1. NFPA 70 – National Electric Code (NEC)
 - 2. NFPA 72 – Local Protective Signaling
 - 3. NFPA 72 – Remote Station Protective Signaling
 - 4. NFPA 72 – Proprietary Protective Signaling

1.3 SCOPE OF WORK:

- A. Furnish, install, and program as shown on plans and as hereinafter specified all equipment, cabling, and terminations for a fully functional system.
- B. The contractor shall furnish complete shop drawings for review and approval.

1.4 SYSTEM DESCRIPTION:

- A. The paging system shall be a highly configurable district wide system that runs on the District's wide area network (WAN) or virtual private network (VPN) by means of a single server application.
- B. The system shall be programmed, monitored, and controlled via a web based Graphical User Interface (GUI) provided by a factory designed server application running on a Microsoft Windows 2000 or 2003 server. The server to receive the application shall be designated by the District.
- C. The application shall support different levels of user privileges as designated by the paging system administrator.
- D. The GUI shall be accessible to all networked computer residing on the district's WAN or VPN. Access to the server shall be granted via login and authentication that supports the Secure Sockets Layer (SSL) / Transport Layer Security (TSL) protocol.
- E. The system shall automatically recognize all system speakers connected to the District's WAN or VPN. Paging options shall be universally configurable to include district wide all page, specific campus all page, campus zone paging, etc.

- F. The number of configurable zones shall be unlimited. A zone may be as small as one speaker or as large as all the speakers. Each speaker may be assigned to an unlimited number of zones.
- G. In addition to live and ad hoc paging, the system shall support playback of recorded messages stored as .wav files, to include the program bell tone, daily announcements, lockdown alert, evacuation alert, etc. The system shall allow a different tone or message for each zone. The system shall also be able to broadcast messages to computer screens running a client application.
- H. The system shall support special calendar schedules to adjust for special events, holidays, etc. The system shall support multiple simultaneous schedules on the same facility (e.g., one schedule for grades 1-6, another for kindergarten, etc.) The system shall be able to automatically compensate for daylight savings time and automatically synchronize the system time with internet time servers.
- I. The system shall log all events that occur and trigger and alarm for any errors or changes (e.g. message send failure, speaker failure, new speaker connected to network, etc.).
- J. The system shall receive voice input from SIP softphones installed on designated computers. The system shall also be capable of interfacing with any analog PBX or VoIP communications system to provide paging from telephone system handsets.
- K. The system shall be capable of initiating sounding specific messages or sending text messages to designate computers as triggered by other systems (e.g., fire alarm, security, etc.) via analog to digital zone controllers.
- L. The system shall be capable of interfacing with any legacy paging system to provide paging features inherent to the legacy system.
- M. Paging system speakers shall connect to the school LAN via CAT6 data cabling and IEEE 802.11af compliant power over ethernet (POE) switches located in data distribution frames. Each speaker shall be individually addressable via dynamic host control protocol (DHCP) addressing. The number of supported speakers shall be limited only by the number of available IP addresses. Speaker operation shall be accomplished by individual amplifiers on each speaker.
- N. The system shall support synchronized digital wall clocks as an integral component of the speaker.
- O. Stand-alone clocks shall be installed and connected to the master clock. Provide master clock at each building IDF where stand-alone clocks are used.

PART 2 – PRODUCTS

2.1 MANUFACTURER:

- A. Atlas Sound
4545 E. Baseline Road, Phoenix, AZ 85042
Phone (800) 876-3333. FAX (800) 765-3435. Website: www.atlassound.com
- B. The manufacturer shall have at least twenty-five (25) years of experience in the role of public address system manufacturing, and a proven track record of forward and backward compatibility for a minimum of twenty (20) years for its product's auxiliary devices, including speakers, amplifiers, and paging equipment.

- C. The manufacturer shall make its hardware products freely available through most distribution channels. Hardware products shall not be exclusive to specific dealers by region or any other basis.
 - D. Provide updated products where these have been replaced.
- 2.2 HEAD END:
- A. Syn-Apps “Revolution” Server Application
- 2.3 IP SPEAKERS:
- A. Ceiling Mount: Atlas Sound #IP-SM speaker and #IP-STBE (flush mount) enclosure or IP-SEA-SD (surface mount) enclosure
 - B. Wall Mount: Atlas Sound #IP-SM speaker and #IP-FEST-SD (flush mount) or #IP-SEA-SD (surface mount) enclosure
 - C. Exterior Vandal Resistant Speaker: Atlas Sound #IP-HVP speaker and #IP-FEST-IH (flush mount) or #IP-SEST-IH (surface mount) enclosure
- 2.4 IP SPEAKER / CLOCKS:
- A. Wall Mount: Atlas Sound #IP-SDM speaker/clock and #IP-FEST-SD (flush mount) or #IP-SEST-IH (surface mount) enclosure
- 2.5 IP CLOCKS:
- A. Wall Mount: Atlas Sound #IP-DM clock and #IP-FEC-DM (flush mount) or #IP-SEC-DM (surface mount) enclosure.

PART 3 – EXECUTION

- 3.1 INSTALLATION:
- A. Horizontal cabling jackets, patch cable jackets, and modular RJ-45 jacks serving the Paging System shall be green in color.
 - B. All new speaker, clock, and speaker/clock installations shall be flush mounted in walls and ceilings. Where an existing paging and clock system is being replaced, surface mounted speakers shall be acceptable at walls and gypsum board ceilings, but flush mounting is still required at T-bar ceilings.
 - C. Provide rack mounted, IP zone amplifiers for exterior speaker runs and corridors with more than 3 speakers only. All other speakers and speaker/clocks shall be individually addressed IP units.
 - D. Install SA-Announce software on a server designated by the district and configure per specifications and owner direction for bell schedule.
 - E. Program three (3) extensions on the existing VoIP managed communications system and interface with the Atlas IP system. The three extensions shall be 1) indoor speakers, 2) outdoor speakers, and 3) both indoor and outdoor speakers (all call).

F. Provide one dedicated handset in administration that dials directly to All Call.

END OF SECTION

SECTION 28 31 00 – FIRE ALARM AND DETECTION

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS:

- A. The Fire Alarm System (FAS) shall be modified as shown in the contract documents. The FAS shall be complete and operational after the work has been performed. All equipment shall be new and unused. All field peripherals shall be designed for continuous duty without interruption or degradation of function or performance. The system shall be designed to provide (24) twenty-four hours of stand-by in the event of loss of primary power, and shall be able to provide (5) five minutes of ring-off.
- B. The equipment and the installation shall comply with the current applicable provisions of the standards, general conditions, and the supplemental conditions identified herein.
- C. Upon completion of the installation of the FAS, a satisfactory test of the entire system shall be made in the presence of the District and the DSA Inspector.

1.02 RELATED DOCUMENTS:

- A. 2019 California Electrical Code.
- B. 2016 NFPA 72 National Fire Alarm and Signaling Code.
- C. The system and all components shall be listed by both Underwriters Laboratories, Inc. and by the California State Fire Marshal for use in fire protective signaling systems.
- D. All requirements of the local authorizing agency.

1.03 COORDINATION:

- A. Confirm compatibility and interface with existing FAS. Report discrepancies to the Architect or Electrical Engineer, and defer ordering until clarified.
- B. Supply mounting hardware, and back boxes to other trades.
- C. Coordinate with Mechanical Division to avoid conflicts between fire alarm equipment & mechanical equipment.
- D. All apparatus mounting shall be coordinated with the architectural reflected ceiling plan. If any discrepancies occur, the Architect or Electrical Engineer must be notified in writing before installation is started.

1.04 SUBMITTALS:

- A. The FAS design is complete. The contractor shall submit complete submittals for FAS equipment components. At least 8 copies of this information shall be submitted to the architect within (30) thirty days after award of this work and shall be subject to the approval of the architect.

- B. The fire alarm components shall be compatible with the existing FAS. All substitute equipment proposed as equal to the specified shall be submitted for pre-approval at least (14) fourteen days prior to the bid date. Provide (3) three copies for review showing a riser diagram, installation drawings, CSFM Numbers, manufacturers data sheets and any differences between the specified equipment and the proposed alternate equipment. Any and all cost increases due to approval by the architect for the use of the alternate equipment shall be borne by the installing contractor.
- C. The system shall be installed in conduit which will be provided and installed by the electrical contractor.

1.05 OPERATION:

The work shown in the contract documents shall be a complete and operating extension of the existing Gamewell FCI addressable, Class B, power limited, FAS. The fire alarm contractor shall verify the compatibility of all components and shall be responsible for ensuring the system is complete and operational.

PART 2 – PRODUCTS

2.01 EQUIPMENT:

Refer to the drawings. The new equipment shall be of the same manufacturer and completely compatible with the existing **Edwards EST 3** addressable, automatic, class B, FAS.

PART 3 – EXECUTION

3.01 FIRE ALARM INSTALLATION:

- A. Installation of the FAS shall be in strict compliance with the manufacturer's recommendations, UL and CSFM Requirements.
- B. All equipment shall be attached as indicated on the contract drawings, and shall be held firmly in place. Fastening and support shall provide a safety factor of five.
- C. As indicated on the contract drawings, each system alarm point or zone of the system shall be uniquely labeled within the fire alarm control panel. Each zone of initiation shall be permanently labeled on the fire alarm control panel.
- D. Provide a complete system of wiring and conduit between all equipment. Unless otherwise specified, all field wiring shall be no. 12 AWG (Quantity as indicated on Drawings) for alarm and 16 AWG TSP For initiation circuits. A maximum of 40% fill shall be allowed for fire alarm raceways. Unless otherwise specified, 3/4 inch conduit shall be the smallest conduit used. All back boxes shall be UL Listed. All back boxes shall be UL Listed. All splices shall be made in UL Listed junction boxes and shall be identified by a unique method as to identify them as related to the use for fire alarm circuit cabling or devices.
- F. All field wiring shall be completely supervised. In the event of primary power failure, disconnected stand-by batteries, removal of any internal modules, or any open circuits in

the field wiring, an audible and visual trouble signal will be activated until the system and its associated field wiring are restored to a normal condition.

- G. Cable shall be the type listed for fire alarm use and shall be installed per CEC article 760.
- H. Cable must be separated from any open conductors of power, or class 1 circuits, and shall not be placed in any conduit, junction box, or raceway containing these conductors, as per CEC article 760.136.

3.02 FINAL CONNECTION:

- A. The system shall be accepted only after a satisfactory test of the entire system has been accomplished by the factory trained distributor in the presence of the authorizing agency, the architect or his representative, and the owner's representative. Upon completion of the installation of the FAS, a satisfactory test of the entire system shall be witnessed in the presence of the DSA inspector.
- B. The installing contractor shall make available to the owner a contract for periodic service, testing, maintenance, and calibration. This contract shall not become effective until the (1) one year installation warranty has expired. The one year installation warranty shall commence upon acceptance of the system by the architect.

3.03 ON-SITE SERVICE:

The installing contractor shall provide comprehensive training on the operation of the system operation, proper use, and testing of the FAS to the owner and the local authorizing agency. General operating instructions shall be posted adjacent to the fire alarm control panel.

END OF SECTION

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SECTION 310000 – OFFSITE DEVELOPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - a. Street improvements include, but are not limited to, demolition, clearing and grubbing, pavement removal, relocating or reconstructing interfering existing utilities, setting manholes and utility boxes to finished grade, constructing permanent pavement, concrete curb and gutter, concrete sidewalks, valley gutter and traffic signs all as indicated on the Plans, in these Specifications, and in conformance with the Local Governing Authority City's or County's Standard Plans and Specifications.
 - b. The Contractor is responsible for all coordination and project scheduling with Gas and Electric Companies, Telephone Company, and Cable Television Company regarding their work of relocating and/or under-grounding their facilities within the street right of ways adjacent to the project site. Such responsibility shall include, but not necessarily be limited to:
 - 1) The Contractor establishing and maintaining communication.
 2. Construct and install street improvements to the Local Governing City's or County's standards.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 03 11 01 CONCRETE FORMWORK
 4. 03 20 00 REINFORCEMENT
 5. 03 30 00 CAST-IN-PLACE CONCRETE
 6. 31 11 00 CLEARING AND DEMOLITION
 7. 31 20 00 EARTHWORK
 8. 31 31 00 SOIL TREATMENT
 9. 32 12 00 PAVEMENT
 10. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 11. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Coordination Drawings:

- a. Submit installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work of this section. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Civil Engineer.
2. Quality Assurance/Control Submittals:
 - a. Test Reports:
 - 1) Submit five (5) copies of reports required by Regulatory Requirements.
 - 2) Submit five (5) copies of testing laboratory's report.
3. Closeout Submittals in accordance with Specification Sections in Division One:
 - a. Project Record Documents in accordance with Specification Section – PROJECT DOCUMENTS.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CAL/OSHA All work shall comply with the rules and regulations of the California Division of Occupational Safety and Health (formally the Division of Industrial Safety), and all other local, state and federal agencies having jurisdiction. Nothing contained herein shall be construed as permitting work that is contrary to such rules, regulations and codes.
 - 1) Full compensation for all costs involved in worker protection from caving ground in excavating shall be included in the lump sum price bid for the work under this contract.
 - b. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - c. COC City of Clovis, Standard Drawings and Specifications, latest edition.
 - d. COF City of Fresno, Standard Drawings and Specifications, latest edition.
 - e. COF County of Fresno, Standard Drawings and Specifications, latest edition.
 - f. COS City of Sanger. Standard Drawings and Specifications, latest edition.
 - g. COT County of Tulare, Standard Drawings and Specifications, latest edition.
 - h. FMFCD Fresno Metropolitan Flood Control District.

B. Surveying and preservation of existing monuments:

1. Surveying for offsite improvements shall be secured and paid for by the Contractor. The Contractor shall be responsible to contract for, coordinate and pay for all such services by a Civil Engineer or Land Surveyor registered in California and acceptable to the Civil Engineer.
2. Carefully preserve all data and monuments set by the Owner's Civil Engineer and, if displaced or lost, the Contractor's Engineer shall immediately replace such monuments to the satisfaction of the Civil Engineer and at no additional cost to the Owner.

C. Monitoring of construction site:

1. The Contractor shall monitor the construction site on a regular basis during non-working hours, including weekends and holidays to ensure that no situations arising, relating to the condition of the work site, which could pose a threat to public safety. In addition the contractor shall furnish to the Owner and to the Local Governing City's or County's Construction Management Division, prior to the issuance of the "Notice to Proceed", a list of persons, together with their addresses and home telephone numbers, who are authorized to act on behalf of the Contractor in an emergency arising out of conditions at the work site after normal working hours.
2. Safe pedestrian crossings shall be maintained at all existing crosswalks and intersections.
 - a. The Contractor shall secure the site of work at all times. Children shall not be allowed in or along the excavation, on spoil piles or at other undesirable locations within the work. The Contractor shall provide suitable traffic and pedestrian warning devices and signs necessary at or near the work as required by safety considerations and/or jurisdictional authorities. Convenient pedestrian detours and/or flagmen and/or safe temporary bridges over excavations, complete with adequate safety rails, shall be provided as necessary.

D. Compaction and compaction tests:

1. The Contractor shall be fully responsible for timely compaction and suitability of material for compaction. Where necessary, wet and pumping material shall be removed from the trench or excavation by the Contractor and replaced with suitable approved material as necessary to complete operations within the times allowed.
2. Compaction requirements for all excavations within public streets, shall be in accordance with the Local City's Encroachment Permit and in accordance with the Local City's Standard Specifications.
3. Initial compaction testing shall be provided by the Owner. The Contractor shall file adequate notice to the Civil Engineer when he desires compaction testing. All required compaction re-testing of backfill because of failure to pass original test shall be at the expense of the Contractor.
4. Full compensation for all costs involved in meeting and satisfying the above requirements shall be included in the amount bid for the various items of work and no separate payment will be made therefor.

1.4 PROJECT CONDITIONS

A. Existing Conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.
3. Before commencing excavation, the Contractor shall notify all utility authorities or utility companies having possible interest in the work of the Contractor's intention to excavate proximate to existing facilities and Contractor shall verify the location of any utilities within the work area.

4. The Civil Engineer has made a diligent attempt to show on the Construction Drawings all pertinent intersecting utilities which may affect the work. Utilities shown in profile view are shown at their most probable locations, based upon available as-built drawings and known construction custom. The Contractor shall exercise caution while performing excavation for this project and shall protect existing utilities from damage, inasmuch as their exact location is unknown until exposed by the excavation.
 5. Because of the close proximity of certain existing parallel or intersecting utilities and the depth of the proposed facilities, it may be necessary for the Contractor to provide special protection for the existing utility, and/or provide for its temporary and/or permanent relocation in order to construct the facilities shown on the Plans. Bracing of power poles may be necessary. The Contractor shall coordinate said work and shall be responsible for complying with the requirements of the utility authority involved. Full compensation for all costs involved in such special protection and/or relocation, including all appurtenances and incidentals, shall be included in the amount bid for the various bid items, and no separate payment shall be made therefor.
 6. All existing utility mains and service lines shall be kept in constant service during the construction of this project. Hand excavating shall be employed where necessary to safely expose existing utilities.
 7. Full compensation for all costs involved in locating, verifying, protecting, exposing, relocating, reconstruction and otherwise providing for utilities shall be included in the amount bid for the various items of work and no separate payment shall be made therefor.
- B. Dust Control:
1. The Contractor shall maintain dust control about the site of the work, including any haul roads to or from the site, by whatever means are necessary, such as watering, sweeping or oiling, so as to cause the least possible dust nuisance to the public. Any dust control measure ordered by the Civil Engineer shall be promptly and immediately carried out.
 2. If the Contractor fails to provide dust control measures so ordered within a period of 2 hours from the time ordered by the Civil Engineer, the Contractor shall pay to the Owner a penalty of Fifteen (15) Dollars for each one half (1/2) hour, or portion thereof, that elapses beyond the 2 hour warning period, until dust control measures ordered by the Civil Engineer are completely carried out and the dust nuisance eliminated or prevented.
 3. Such penalty shall be deducted from any monies owed the Contractor. In addition to the penalty as specified above, if conditions warrant, the Civil Engineer may employ other forces to eliminate or prevent the dust nuisance. The full cost thereof, in addition to the penalty as herein provided, shall be deducted from any monies owed the Contractor.
 4. Full compensation for dust control shall be included in the amount bid for the various items of work and no separate payment will be made therefor.
- C. Traffic Control:
1. Traffic control measures shall be fully and completely carried out at all times to the satisfaction of the COT. If the Contractor fails to provide satisfactory traffic control the Owner may obtain services from other sources and deduct from the contract the cost thereof.
 2. Through traffic shall be provided for during non-working hours including, but not limited to, weekends, holidays and at night.
 3. The Contractor shall comply with all requirements of the Local City's Street Encroachment Permit.
- D. Protective measures:

1. Furnish, place, and maintain all supports, shoring, and sheet piling which may be required for the sides of excavation or for protection of adjacent existing improvements. The adequacy of such systems shall be the complete responsibility of the Contractor.
2. Maintain all bench marks, monuments and other reference points. If disturbed or destroyed, replace as directed.
3. Forty-eight (48) hours prior to beginning construction, the Contractor shall notify the owners of all properties adjacent to the proposed construction. The Contractor shall also provide the property owners with an estimate of the length of time that their properties will be affected by his construction activities.

E. Permits:

1. The Contractor shall secure and pay for all permits required for work under this contract including, but not limited to, the Local City’s Encroachment Permit.
2. All costs associated with obtaining permits as required by construction and as indicated herein shall be included in the price bid for the various items of work and no separate payment will be made therefor.
3. The Contractor shall pay all inspection fees required by governmental agencies.
4. The Contractor shall obtain a permit from the Division of Occupational Safety and Health of the State of California prior to the commencement of construction. Full compensation for said permit shall be included in the price bid for the various items of work and no separate payment will be made therefor.

F. Fees:

1. Fees for the offsite street improvements are clarified as follows:
 - a. Fees to be paid by Contractor and to be included as part of his bid:
 - 1) Inspector Fees _____.
 - b. Fees to be paid by Owner:
 - 1) Plan Review Fee _____.
2. The Contractor shall also be responsible to secure and pay for the Local City’s Street Encroachment Permit, as well as all required bonds and insurance. All references made by the "General Notes for Street Construction" to the "Developer" shall be interpreted to mean "Contractor," except "The Owner shall pay for all initial compaction tests." Contractor shall pay for all required re-tests.

1.5 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.

C. Installer's Warranty:

1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All materials incorporated in street construction shall conform with the Local City's Standard Plans and Specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
 - 1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
 - 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 - 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Coordination:
 - 1. Coordinate work under this specification section with work specified under other specification sections to ensure proper and adequate interface of work specified under this specification section.
- B. Protection:
 - 1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
- C. Surface preparation:
 - 1. Prepare surface in accordance with manufacturer's written instructions and recommendations.

3.3 CONSTRUCTION

- A. Interface with other work:
 - 1. Construction of street facilities shall be performed in accordance with the Local City's Standard Plans and Specifications.
 - 2. The Contractor shall be responsible to protect all other existing and proposed utilities and improvements affected by his work.
 - 3. The Contractor shall cooperate with all other contractors on the job to insure that his activities do not delay or hinder the construction activities of others.

4. All excess earth from trenching and off-site grading may be deposited within the boundaries of the school site at a location specified by the Civil Engineer for incorporation in site grading activities. All such earth shall be free of organic material, large rocks, hardpan, asphalt paving and other deleterious materials.
5. The Contractor shall be aware that the work of this contract is a portion of the total work required for the construction of the project site. The Contractor shall coordinate his work and his schedule fully with other forces performing work relating to the construction of the above stated project. Included in these "other forces" are Gas and Electric, Telephone, the forces constructing on-site improvements for the above stated project and any other forces performing work within the project area which requires coordination with the work of this contract.
6. The Contractor shall coordinate his efforts with other forces performing on-site work such that said forces are provided with adequate access to the site.

3.4 FIELD QUALITY CONTROL

A. Site Tests:

1. As required by Regulatory Requirements.

B. Inspection:

1. As required by Regulatory Requirements.
2. Schedule inspections and notify the Architect, Owner's Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.

END OF SECTION

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SECTION 31 1000-SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Clearing and grubbing.
3. Stripping and stockpiling topsoil.
4. Removing above- and below-grade site improvements.
5. Disconnecting, capping or sealing, and removing site utilities.
6. Temporary erosion- and sedimentation-control measures.

B. Related Sections:

1. Section 01 5000 "Temporary Facilities and Controls" for temporary utility services, construction and support facilities, security and protection facilities, and temporary erosion- and sedimentation-control measures.
2. Section 01 7300 "Execution" for field engineering and surveying.
3. Section 02 4119 "Selective Demolition" for partial demolition of buildings or structures.

1.2 DEFINITIONS

- A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow.
- D. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 3 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.
- E. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.

- F. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and.
- G. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.3 MATERIAL OWNERSHIP

- A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.4 INFORMATIONAL SUBMITTALS

- A. A Dust Control Plan approved by the San Joaquin Valley Air Pollution Control District (SJVAPCD).

1.5 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Utility Locator Service: Notify Underground Service Alert at 1-800-227-2600 at least 2 working days in advance of construction to locate utilities in the public way.
- C. The Contractor shall be responsible for retaining a qualified utility locating service to locate all other private utilities in the work area. It shall be the responsibility of the Contractor to determine the existence and location of those utilities shown on the drawings or indicated in the field by locating services. Any additional costs incurred as a result of Contractor's failure to verify locations of existing utilities prior to beginning of construction in their vicinity shall be borne by the Contractor and assumed included and merged into the contract price.
- D. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.
- E. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 31 2000 "Earth Moving."
 - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. The State of California Regional Water Quality Board requires that all projects disturbing one acre or more of land shall file a Notice of Intent to the Board and must implement a Storm Water Pollution Prevention Plan (SWPPP) in order to meet the requirements of the Construction General Permit 2012-0006-DWQ. Construction work shall not commence until the SWPPP is completed and a Waste Discharger Identification (WDID) number is assigned.
 - 1. The Owner will prepare the SWPPP, pay all fees to the Regional Water Quality Control Board (RWQCB) and obtain a WDID number. The Owner will also be responsible for annual fees payable to the Regional Water Quality Control Board (RWQCB) until termination of the permit.
 - 2. The Contractor is responsible for retaining a qualified a Qualified SWPPP Practitioner (QSP), implementing the SWPPP and ensuring that all documents are kept up to date and in compliance with State requirements, including submitting annual reports and filing the Notice of Termination (NOT) with the RWQCB.
- B. The San Joaquin Valley Air Pollution Control District regulates all dust control and emission standards throughout the Central Valley. Regulation VIII – Fugitive PM10 Prohibitions requires that a Dust Control Plan (DCP) be completed for this project. Construction work shall not commence until the DCP is completed and approved by the District. It shall be the Contractor's responsibility to prepare the DCP, pay all applicable fees and implement all measures listed in the Plan.

- C. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- D. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- E. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- F. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

- A. General: Protect trees and plants remaining on-site according to requirements in Section 01 5639 "Temporary Tree and Plant Protection."
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

3.4 EXISTING UTILITIES

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.
 - 1. Arrange with utility companies to shut off indicated utilities.
- B. Locate, identify, and disconnect utilities indicated to be abandoned in place.
- C. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
- D. Excavate for and remove underground utilities indicated to be removed.

3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.

2. Grind down stumps and remove roots, obstructions, and debris to a depth of 24 inches below exposed subgrade.
 3. Use only hand methods for grubbing within protection zones.
 4. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to at least 90% relative compaction.
- 3.6 TOPSOIL STRIPPING
- A. Remove any weeds before stripping topsoil.
- B. Strip topsoil 1 to 3 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.
1. Remove subsoil and non-soil materials from topsoil, including clay lumps, gravel, and other objects more than 3 inches in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
1. Limit height of topsoil stockpiles to 72 inches.
 2. Do not stockpile topsoil within protection zones.
 3. Stockpile surplus topsoil to allow for respreading deeper topsoil.
- 3.7 SITE IMPROVEMENTS
- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
- 3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS
- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

- B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 31 1000

SECTION 311100 – CLEARING AND DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Section includes requirements governing execution of the work including, but not limited to, the following:
 - a. Demolition and removal of small building(s) or structure(s).
 - b. Demolition and removal of above and below ground site improvements.
 - c. Removal of Contaminated Soils.
 - d. Removal of trees and shrubs.
 - e. Clearing and grubbing.
 - f. Stripping and stockpiling.

- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS
 - 3. 02 01 10 EXISTING LANDSCAPE MAINTENANCE
 - 4. 02 26 00 HAZARDOUS MATERIALS PROCEDURES
 - 5. 02 49 19 SELECTIVE DEMOLITION
 - 6. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP
 - 7. 31 00 00 OFFSITE DEVELOPMENT
 - 8. 31 20 00 EARTHWORK
 - 9. 32 12 00 PAVEMENT
 - 10. 32 90 00 LANDSCAPE PLANTING

1.2 DEFINITIONS

- A. Existing to Remain: Existing item(s) within project site that is not to be permanently removed and that is not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

- B. Remove: Detach item(s) and legally dispose or recycle off-site.

- C. Remove and Reinstall: Detach item(s) from existing site or building and prepare for reuse. Reinstall where indicated.

- D. Remove and Salvage: Carefully detach items(s) from existing site or building, in a manner to prevent damage, and deliver to Owner.

- E. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms

- F. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow.

- G. Vegetation: Native trees, shrubs, grass, and other plants indigenous to the site.

1.3 SUBMITTALS

- A. Submit in accordance with specification section – SUBMITTAL PROCEDURES:
 - 1. Shop Drawings:
 - a. Proposed Protection Measures – Submit report and drawings that indicate the measures proposed for protecting property for dust and noise control.
 - 1) Indicate proposed locations and construction of barriers.
 - 2) Indicate how long utility services will be interrupted.
 - b. Salvaged Item Inventory List
 - 1) Indicate items to be salvaged and delivered to Owner.
 - 2. Closeout Submittals:
 - a. Pre-demolition Photographs

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. In accordance with specification section – REGULATORY REQUIREMENTS and the following:
 - a. CARB California Air Resources Board. Materials and equipment used for this project shall comply with the current applicable regulations and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. CAL/OSHA California Division of Occupational Safety and Health Administration
 - c. COC City of Clovis, Standard Drawings and Specifications, latest edition.
 - d. COF City of Fresno, Standard Drawings and Specifications, latest edition.
 - e. COF County of Fresno, Standard Drawings and Specifications, latest edition.
 - f. COS City of Sanger, Standard Drawings and Specifications, latest edition.
 - g. COT County of Tulare, Standard Drawings and Specifications, latest edition.
 - h. EPA Environmental Protection Agency
 - i. FMFCD Fresno Metropolitan Flood Control District.
- B. Meetings:
 - 1. Pre- Demolition and Clearing: Schedule prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Review requirements of work performed by others that rely on soil and/or substrates exposed by clearing and demolition work.
 - c. Identify any potential problems, which may impede planned progress and proper clearing and demolition work.
 - d. Review areas where existing item(s) are to remain and requires protection.
 - e. Review demolition waste disposal and material recycling procedures.
 - 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper work progress.
 - b. Identify any problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
 - 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems.

- b. Establish method and procedures to maintain protections while progressing to project completion.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Cleaning, handling, and packing:
 1. Salvaged Items and Reinstalled Items shall be handled in such a manner as to assure that they are free from damage.
 2. Salvaged Items shall be cleaned and packed or cleaned and palleted.
 3. Reinstalled Items shall be cleaned.
- B. Storage and protection
 1. Salvaged Items and Reinstalled Items shall be stored in a dry, protected area.
 2. Salvaged Items and Reinstalled Items shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation underneath.
 - a. Cover with protective waterproof covering providing for adequate air circulation and ventilation.
- C. Waste Management and Disposal:
 1. Disposal of all demolition items shall be per Specification Section - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
 2. All excavated top soil and land clearing debris shall be stockpiled on-site and reused or recycled.
 - a. Grade and shape stockpiles to drain surface water.
 - b. Cover stockpiles to prevent windblown dust and erosion by water.

1.6 PROJECT CONDITIONS

- A. Environmental requirements;
 1. Dust control: perform work in a manner as to minimize the spread of dust and flying particles.
 - a. Thoroughly moisten appropriate surfaces as required to prevent dust from being a nuisance to the public and neighbors.
 2. Noise control: perform work in a manner as to minimize construction noise.
 - a. When a certain level of noise is unavoidable and is objectionable to the neighbors, coordinate with Owner and make arrangements to perform such work at the most appropriate time periods of the day.
 3. Erosion control: do not perform site clearing operations until temporary erosion and sedimentation control measures are in place.
 4. Burning: No burning will be allowed on-site.
- B. Existing conditions:
 1. Examine project site and building(s) and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
 2. Conduct work so as not to interfere unnecessarily with adjacent buildings, roads, streets, drives, and walks.

- a. Do not close or obstruct streets, alleys, walks, or passageways without permission from authorities having jurisdiction and coordinating same with immediate neighbors whose business operation may be affected.
- b. Provide alternate routes around closed or obstructed traffic ways if required by the authorities having jurisdiction.
- c. Safety measures shall be taken to insure an uninterrupted flow of traffic around the site as required by local Fire and Police Departments.
- 3. Maintain existing utilities indicated to remain in service and protect against damage during clearing and demolition work.
- 4. Demolition waste becomes the property of the Contractor.
- 5. Storage or sale of removed items on-site is not permitted.
- 6. It is not expected that hazardous materials will be encountered in the Work.
 - a. Hazardous materials will be removed by Owner before start of the Work.
 - b. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner.
- 7. Hazardous materials are present in buildings and structures to be demolished. The Owner has prepared a report for the Contractor to review and use.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Furnish all materials, tools, equipment, facilities, and services as required for performing the clearing, demolition, and removal work.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of conditions:
 - 1. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 - 2. Execution of work under this specification section shall constitute acceptance of existing conditions.
 - 3. Obtain all necessary permits and authorizations by regulatory agencies required to perform the Work under this Section.
 - 4. Record existing conditions by use of Pre-demolition Photographs.
 - a. Inventory and record the condition of items to be salvaged and/or re-installed.
 - 5. Examine the location of existing utilities as identified per Specification Section - FIELD ENGINEERING.

3.2 PREPARATION

- A. Coordination:
 - 1. Before proceeding, verify plans match existing conditions.

2. Review documents of existing construction provided by Owner against existing conditions.
3. If conflicts are encountered, report it to the Architect. Then prepare recommendation(s) for correction and submit to Architect for review.
4. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
 - a. Coordinate with the requirements of Specification Section - EXISTING LANDSCAPE MAINTENANCE for protection of trees, shrubs, turf, and vegetation.
5. Coordinate any utility shut-down with owner 48 hours in advance of the anticipated shut-down.
 - a. Do not interrupt utilities serving adjacent existing facilities, except when authorized in writing by the Owner.
 - b. Provide temporary service during interruptions to existing facilities, as may be required by the Owner to maintain essential services.
 - c. Coordinate location of existing utilities with Specification Section - FIELD ENGINEERING.
6. Prior to clearing and demolition, review status of trees and shrubs with Architect and Owner. The Owner may wish to relocate trees or shrubs to outside the limits of construction.

B. Protection:

1. Structure and Property:
 - a. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings, landscape, and facilities to remain.
 - b. Provide protection to ensure safe passage of people around clearing and demolition area and to and from adjacent building(s) and site.
 - c. Protect and maintain benchmarks and survey control points from disturbance during clearing and demolition operations.
 - d. Protect and maintain utility services to remain.
 - e. Protect existing improvements designated to remain from damage during construction.
 - f. All damage inflicted on public and private property and the property of the Owner shall be repaired or restored to the original condition prior to the start of this Work. All repair or replacement work shall be done at no additional cost to the owner.

3.3 APPLICATION

A. General:

1. Implement temporary erosion control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
 - a. Inspect, maintain, and repair temporary erosion control measures during construction and until permanent landscape has been established or until new improvements are completed.
2. Arrange with utility companies to shut off indicated utilities.
 - a. Excavate and remove underground utilities as indicated.
 - b. Excavate, cap, and seal underground utilities as indicated.
 - c. Utility lines to be abandoned within the construction area shall be removed and stubbed off outside the limits of construction.
3. Visually locate trees, shrubs, turf, and vegetation to remain.
 - a. Salvage trees, shrubs, and vegetation to be re-installed or returned to Owner.

B. Demolition:

1. Demolition shall include the removal of all components of the existing building and/or site described in the documents to be removed. Unless otherwise specified, the component identified for removal shall include all materials, accessories and fabrications associated with that component.
 - a. At pavement or concrete on grade: unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement or concrete to remain before removing adjacent material. Saw-cut faces vertically.
2. Removed and Salvaged items:
 - a. Clean salvaged items.
 - b. Pack or crate items after cleaning. Identify contents of containers.
 - c. Store items in a secure area until delivery to Owner.
 - d. Transport item to Owner's storage area off-site.
 - e. Protect items from damage during transport and storage.
 - f. In addition to items indicated elsewhere, salvageable items that the Owner wants to retain in usable condition is as follows:
 - 1) All door hardware
 - 2) All unit heater and controls
 - 3) All energy management controls
 - 4) All security system devices
3. Removed and Reinstalled items:
 - a. Clean and repair items to functional condition adequate for intended reuse.
 - b. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - c. Protect items from damage during transport and storage.
 - d. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
4. Existing Items to Remain:
 - a. Protect construction indicated to remain against damage and soiling during clearing and demolition operations.
5. Remove debris, concrete, asphalt, and any other obstruction above and below-grade to the extent indicated.
6. Remove all:
 - a. Buried objects which will interfere with the Work.
 - b. Septic Systems.
 - c. Irrigation lines, irrigation risers, and irrigation valves.
 - d. Stand pipes.
 - e. Water wells and pumps.
 - f. Electrical service and power poles.
7. Demolished items that are recyclable or slated for disposal shall be promptly dealt with per Specification Section - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

C. Clearing and Grubbing:

1. Refer to drawings for trees and shrubs to be removed.
2. Remove tops, trunks, and roots of trees and shrubs to a minimum depth of 3 feet or to a depth required to remove all roots 1/4 inch diameter and larger.
3. Remove all sod, turf, and grass before stripping topsoil.
 - a. Stockpile for recycling as mulch. Refer to Specification Section - LANDSCAPE PLANTING for treatment.

- b. Stockpile for recycling as mulch. Remove material to recycling station.
- c. Legally dispose off-site.
- 4. Chip removed trees, shrubs, and roots.
 - a. Remove chipped material to recycling station.
 - b. Recycle chipped material into mulch for this project. Refer to Specification Section - LANDSCAPE PLANTING for treatment.

D. Topsoil Stripping:

- 1. Strip topsoil to a minimum depth of 12 inches.
 - a. Prevent intermingling with underlying subsoil or other waste materials.
 - b. Perform only when the topsoil is dry or slightly moist.
- 2. Remove subsoil, and non-soil materials from topsoil, including clay lumps, gravel, trash, debris, weeds, roots, other waste materials, and objects more than 1/2 inch in diameter.
- 3. Stockpile reusable topsoil away from excavation and where work is to proceed without intermixing with subsoil.
 - a. Do not stockpile topsoil within drip line of remaining trees.
- 4. Non-soil materials removed from topsoil shall be separated into like materials and recycled either within the project or removed from the project site to a recycling station.
 - a. Those waste materials that are non-recyclable shall be legally disposed off of the project site.

3.4 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT:

- 1. Clean any soiled surfaces to remain immediately.
- 2. Existing substrates shall be clean and ready for the installation of any additional materials.
- 3. Leave site level and free of any ruts or debris. Appearance of earth surface shall be equal to or better than adjacent undisturbed surfaces.

END OF SECTION

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SECTION 312000– EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to do all Earthwork and other related items necessary to complete the Project as indicated by Contract Documents unless specifically excluded.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 03 11 01 CONCRETE FORMWORK
 4. 03 20 00 REINFORCEMENT
 5. 03 30 00 CAST-IN-PLACE CONCRETE
 6. 04 22 00 CONCRETE MASONRY UNITS
 7. 07 14 16 FLUID-APPLIED WATERPROOFING
 8. 31 00 00 OFFSITE DEVELOPMENT
 9. 31 11 00 CLEARING AND DEMOLITION
 10. 31 31 00 SOIL TREATMENT
 11. 32 12 00 PAVEMENT
 12. 32 19 19 ORNAMENTAL METAL
 13. 32 31 13 CHAIN LINK
 14. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 15. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data:
 - a. Information indicating the source of all import material, the fill material type and where it is to be used.
 2. Quality Assurance/Control:
 - a. Material Test Reports:
 - 1) Classification of Soils.
 - 2) Compaction Characteristics of Soils.
 - 3) Density and Unit Weight of Soils in Place.
 - 4) Environmental Contaminates Report.
 - 5) Import Soil:
 - a) Letter of certification from Owner's Testing Lab indicating material conforms to DTSC requirements.
 - b) Soil Test Results.
 3. Project Closeout: In accordance with Specification Section – PROJECT CLOSEOUT.

- a. Drawings indicating the extent and depth of all engineered fill. This information shall be a part of the Project "As-Built" and Project "Record" Documents in accordance with the Specification Section – PROJECT DOCUMENTS.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Material:

a. Soils Report: Prepared by:

- 1) Technicon Engineering Services, report TES No. 220239.001 dated May 17, 2022.
- 2) The report of the existing soil conditions is available for reference only at the Geotechnical Consultant's office for purchase at the cost of reproduction.

2. Installer:

- a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this project.

B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS and the following:

- a. AHJ Authority Having Jurisdiction
- b. CAL/OSHA Comply with all provisions of the Construction Safety Orders and the General Safety Orders of the California Division of Occupational Safety and Health, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground excavations.
- c. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
- d. COT City of Tulare, Standard Drawings and Specifications, latest edition.
- e. COT County of Tulare, Standard Drawings and Specifications, latest edition.
- f. DTSC California Department of Toxic Substances Control.
- g. EPA Environmental Protection Agency.
- h. SJVAPCD San Joaquin Valley Air Pollution Control District.

C. Certificates:

- 1. Installer's certification that all Earthwork installation meets or exceeds the requirements of this specification.
- 2. Contractor's certification (on Contractor's letterhead paper) that the Earthwork materials and installation meets or exceeds the requirements of this specification.
- 3. Contractor and Supplier of imported material shall provide certification from the Owner's Testing Lab to certify that the soils do not contain any environmental contaminants regulated by Local, State or Federal Agencies. Cost of testing is the responsibility of the Contractor.

D. Meetings:

- 1. Pre-Installation: Schedule prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.

2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.4 PROJECT CONDITIONS

A. Existing Conditions:

1. Examine site and verify conditions with the Drawings and Specifications.
2. Thoroughly investigate and verify conditions under which the Work is to be performed.
3. Locate and identify utilities:
 - a. Call a Local Utility Locater Service (USA - "Underground Service Alert") for the task of locating any applicable off-site and on-site utilities in the area where the Project is located.
4. No allowance for extra Work will be granted resulting from negligence or failure to meet requirements of Article titled "Existing Conditions" above.

B. Environmental Requirements:

1. Dust control: Perform work in a manner as to minimize the spread of dust and flying particles. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.
 - a. All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilized of dust emissions using water, chemical stabilizer/suppressant, or vegetative ground cover.
 - b. All on-site unpaved roads shall be effectively stabilized of dust emissions using water or chemical stabilizer/suppressant.
 - c. All land clearing, grubbing, scraping, excavation, land leveling, grading, and cut and fill activities shall be effectively controlled of fugitive dust emissions utilizing application or water or by presoaking.
 - d. When materials are transported off-site, all material shall be covered, effectively wetted to limit visible dust emissions or at least six inches of freeboard space from the top of the container shall be maintained.
 - e. All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at least once every 24 hours when operations are occurring. The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions. The use of blower devices is expressly forbidden.
 - f. Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/ suppressant.
2. Burning: No burning will be allowed on-site.
3. Rain: Work under this section shall not be started or maintained under threat of rain, unless the work is not affected by the rain.
4. Do not place fill during weather conditions which will alter moisture content of fill materials sufficiently to make compaction to the specified densities difficult or impossible.

5. When reference is made to SWPPP (Storm Water Pollution Prevention Plan, if any within this Project Manual), then comply with all environmental protection requirements included therein.
 6. In accordance with EPA and AHJ.
- C. The San Joaquin Valley Air Pollution Control District regulates all dust control and emission standards throughout the Central Valley. Regulation VIII - Fugitive PM10 Prohibitions requires that a Dust Control Plan be completed for a large majority of construction projects>
1. This project is less than 5.0 acres, thus a Dust Control Plan is not required.
 2. A construction Notification form shall be submitted to the San Joaquin Valley Air Pollution Control District at least 48 hours prior to commencing any earthmoving activities.
 3. Whether a Dust Control Plan is required for the project or not, the Contractor shall be responsible for complying with the requirements of Rule 8021.
- D. Protection:
1. Protect cut and fill areas to prevent water running into excavation. Maintain areas free of water. Remove seeping water immediately by pumps.
 2. Protect cut slopes from erosion due to precipitation and other sources of runoff.
 3. Protect utilities to remain within the construction area and special construction. If utility lines are uncovered (water, electric, sewer, etc.) not shown on the drawings during excavation of site, notify the Architect promptly for its review and action.
 4. Do not permit access to undeveloped portions of the site, nor to areas that are outside of the limits of grading.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Locator Tape:
1. Tape shall be an inert material such as polyethylene plastic with a metallic core, and highly resistant to alkalis, acids, or other chemical components likely to be encountered in soils. The tape shall be bright colors for contrast with the soils with identifying print in black letters. The tape shall be 6 inches wide and installed over all of the pipelines as shown on the drawings.
- B. Earth Fill:
1. Fill shall consist of non-hazardous, non-expansive, low corrosivity and predominantly granular material composed of a reasonably well graded mixture of hard inert mineral fragments, approved by the Geotechnical Engineer.
 2. Free of brush, roots, sod, rubbish or other organic materials or clay.
 3. Free of rocks **3 inches** or larger in greatest dimension. Not more than **15 percent** larger than **2-1/2 inches**. Remove rock or stones, which may interfere with the action of compacting equipment.
 4. Materials excavated from the site below the top **twelve (12)** inches may be used, subject to approval by the Geotechnical Engineer.
 - a. On-Site materials shall be in accordance with Earth Fill paragraph within this specification section, and remove all roots **1/4 inch** in diameter or larger.
 - b. The moisture content of the soil shall be within two percent of optimum moisture content at the time of placement.

5. Imported soil shall be predominantly granular material, as described in PART 2 paragraph titled IMPORT MATERIAL.
- C. Engineered Fill:
1. All Engineered Fill shall be in accordance with Earth Fill paragraph in this specification section.
 2. Import Material:
 - a. Import Material to be used as Engineered Fill shall have the consistency as follows:
 - 1) Percent Passing 3-inch Sieve 100
 - 2) Percent Passing No. 4 Sieve 60-100
 - 3) Percent Passing No. 200 Sieve 10-40
 - 4) Plasticity Index Less than or Equal to 8
 - 5) Expansion Index Less than 10
 - 6) "R• " Value (for fill placed in pavement areas only) Minimum 25
 - b. The Contractor shall be responsible for securing an acceptable source of import material with the approval of the Geotechnical Engineer and the Owner's Testing Lab prior to transport to the site.
 - c. All import material shall meet the standards and criteria of DTSC for environmentally clean soil suitable for school construction.
 3. Materials excavated from the site below the top **twelve (12) inches** inches may be used, subject to approval by the Geotechnical Engineer:
 - a. On-Site soils shall be in accordance with Engineered Fill paragraph in this specification section and remove all roots 1/4 inch in diameter or larger.
- D. Back Fill:
1. In accordance with Article titled "Earth Fill" above, within this specification section.
 - a. Lean Concrete: Refer to Specification Section – CAST-IN-PLACE CONCRETE.
 2. Mechanical and Plumbing Utility Trench Back Fill shall be soil in accordance with "Earth Fill" paragraph within this specification section, unless indicated otherwise within this Project Manual.
 3. Electrical Utility Trench Back Fill shall be sand in accordance with "Sand Fill" (for Electrical Trenches) paragraph within this specification section, unless indicated otherwise within this Project Manual.
- E. Sand Fill:
1. Sand to be washed and of natural siliceous or igneous origin, having hard, strong, and durable particles.
 2. Sand shall comply with ASTM C 33 "Standard Specification for Concrete Aggregates", generally as follows:
 - a. **Percent passing 3/8 inch sieve: 100%.**
 - b. **Percent passing No. 4 sieve: 95 to 100%.**
 - c. **Percent passing No. 50 sieve: 10 to 30%.**
 - d. **Percent passing No. 100 sieve: 2 to 10%.**
- F. Finish Fill:
1. Predominately granular material composed of a reasonably, well-graded mixture of hard inert mineral fragments approved by Geotechnical Engineer.
 2. Shall be topsoil free of brush, roots, sod, rubbish or other organic materials.
 3. Free of rocks **1/2 inch** or larger and not more than **15 percent**.
 4. Topsoil stripped from the top **twelve (12) inches** from the site may be re-used subject to approval by the Geotechnical Engineer.

- a. On-Site topsoil shall be in accordance with Finish Fill paragraph in this specification section.
- G. Gravel Back Fill at Pool Structure
1. All backfill in contact with or within the clear zone of the Myrtha structure, as defined by the area pool side of a vertical plane at the furthest structural support, will consist of material, be placed and compacted per the manufacture's specifications. This associated material shall be what is commonly referred to as a self-compacting pea gravel with the following basic characteristics.
 - a. Well drained.
 - b. Cohesionless material.
 - c. Average grain size of less than 1".
 - d. Consistently even distribution.
 - e. Self-compacting in nature.
 - f. Clean and washed.
 - g. Smooth non-angular surface.
 2. Approval of suitable contractor selected materials for this specialized backfill will be the sole discretion of the pool shell manufacturer.

2.2 SOURCE QUALITY CONTROL

- A. Tests, Inspection:
1. Material Test Reports: Performed by the Owner's Testing Laboratory agency in accordance with the Specification Section – TESTING LABORATORY SERVICES, indicating and interpreting test results for compliance of the following with requirements:
 - a. Classification according to ASTM D 2487 "Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)," of each on-site and import soil material proposed for fill and backfill.
 - b. Laboratory compaction curve according to ASTM D 1557 "Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lb./sq.ft.)," for each on-site and import soil material proposed for fill and backfill.
 2. Material Test Reports: Performed by the Owner's Testing Laboratory agency in accordance with the Specification Section – TESTING LABORATORY SERVICES, indicating and interpreting test results for compliance of the following with requirements:
 - a. Imported soil: Test report showing import fill dirt chemicals are within allowable DTSC standards.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual, which affect the execution of work under this specification section.
 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.

3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION:

A. Layout of Work:

1. Contractor shall be responsible for all lines and grades.
2. Check all bench marks, monuments and property lines and verify locations.
3. Locate and maintain all grade stakes.
4. Monuments moved or displaced during grading operation are to be replaced by a California Registered Civil Engineer or Surveyor, at Contractor's expense.

B. Coordination:

1. Coordinate work under this specification section with work specified under other specification sections to ensure proper and adequate interface of work.
2. If this project contains a STORM WATER POLLUTION PREVENTION PLAN (SWPPP), coordinate with the requirements of that section for protection of the site and adjacent properties.

C. Protection:

1. Protect and maintain all benchmarks and survey control points from disturbance during clearing and demolition operations.
2. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
3. Protect existing improvements designated to remain from damage during construction.
 - a. Restore damaged improvements to their original condition, as acceptable to the Owner.
 - b. Support exiting fences as required, where site earthwork operations are near existing fence posts or footings.

D. Utility Location Services

1. Retain the services of a utility location contractor to map the site and locate any underground utility within the limits of the work.
2. If the utility is not and existing site utility being utilized by the campus and the current work, then remove the utility and remove all trenching and backfill that may occur.

E. Surface Preparation:

1. Stripping:
 - a. Remove all topsoil, vegetation, organics and debris from entire project site. Remove to a minimum of stripping depth of **six (6) inches**.
 - b. Stripped topsoil, with an organic content between 3 and 12 percent by weight, may be stockpiled and used as Finish Fill.
 - c. Stockpile stripped topsoil suitable to be re-used as Finish Fill for:
 - 1) Landscape areas.
 - 2) Athletic Field areas.
 - 3) Stripped topsoil is not suitable for use as Earth Fill and Engineered Fill.
 - 4) Stockpile the stripped topsoil in a location near the ball field and away from soil that is suitable for Earth Fill and Engineered Fill.
2. Soil with an organic content greater than 12 percent by weight shall be removed from the site.

3. Removal of loose or organic soils resulting from Specification Section – CLEARING AND DEMOLITION.
 - a. All loose or organic materials resulting from excavations and removal of:
 - 1) Irrigation lines.
 - 2) Trees.
 - 3) Vineyards.
 - 4) Wells.
 - 5) Debris pits.
 - 6) Uncontrolled fills.
 - 7) Existing above and below grade improvements shall be removed.
 - b. Expose undisturbed native soils, scarify to a minimum depth of **six (6) inches**, then compact as Engineered Fill.
 - c. Backfill with Engineered Fill at building areas, exterior pavement areas, concrete slab areas and improvement structures.
 - 1) Backfill with Earth Fill at Landscape and Athletic Field areas.

3.3 CONSTRUCTION

A. Over-excavation:

1. Over-excavation shall occur after stripping operations.
2. Over-excavate at all planned building areas to a depth indicated on the drawings, but not less than five feet (5'-0) below exposed grade.
 - a. Over excavation for the the pools shall extend **eighteen inches (18")** below the pool concrete floor, but no less that 5 feet below exposed grade.
3. Over-excavate to a depth indicated on the drawings, but not less than **twenty-four (24) inches** below exposed grade at:
 - a. Exterior pavement (drives, parking and playcourt) areas.
 - b. Concrete slab (emergency access, sidewalk, and curb) areas.
 - c. Improvement structures.
4. Extend over-excavation for a distance of not less than **five (5) feet** beyond the perimeter of the footprint of each:
 - a. All areas withing the limits of the Pool Fence; including the pool, concrete pool deck and pool buildings.
 - b. The site has hydrocomacted soil, and the pool, concrete pool deck and the pool buildings and the pool deck cannot be supported on the hydrocomacted soil. Remove the upper five feet of the hydrocomacted soil and processed for use as engineered fill.
 - c. Building Pad areas.
 - d. Pool Deck/Concrete slab areas.
 - e. Over-excavation shall not undermine and extend beyond past existing site improvements that are to remain.
5. Stockpile excavated on-site soils suitable to be re-used as Earth Fill or Engineered Fill.
6. Remove all unsuitable excavated material.

B. Scarification and Compaction:

1. Scarification and Compaction shall occur after over-excavation operations.
2. The exposed grade in areas to receive Earth Fill and Engineered Fill shall be scarified to a minimum depth of **eight (8) inches**.
3. Moisture condition to within **two (2) percent** of optimum moisture content.

4. Compact to at least **ninety-two (92)** percent of the maximum dry density in accordance with ASTM D 1557 "Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lb./sq.ft.)."
 5. The subgrade soil should be uniformly moisture conditioned, proof rolled to detect soft or pliant areas, and compacted to the requirements for engineered fill.
 6. The moisture content attained during grading and building pad preparation shall be maintained between the completion of grading and the placement of the vapor retarder, concrete slabs, footings and concrete flatwork. The moisture content shall be tested and approved by the project Geotechnical Engineer in writing prior to the start of construction. If the moisture content is not maintained between the conclusion of grading and the start of construction, the moisture content will need to be re-established.
- C. Construction during wet and inclement weather:
1. Should site grading be performed during or subsequent to wet weather, near-surface site soils may be significantly above optimum moisture content. These conditions could hamper equipment maneuverability and efforts to compact site soils to the recommended compaction criteria. Disking to aerate, chemical treatment, replacement with drier material, stabilization with a geotextile fabric or grid, or other methods may be required to mitigate the effects of excessive soil moisture and facilitate earthwork operations. Any consideration of chemical treatment (e.g. lime) to facilitate construction would require additional soil chemistry evaluation and could affect landscape areas and some construction materials.
- D. Placing Earth Fill:
1. Shall occur after scarification and compaction operations.
 2. Spread Earth Fill in successive layers that will result in compacted layers **six (6) inches** thick maximum.
 3. Moisten or dry Earth Fill to obtain optimum moisture content for compaction. Add water as required to obtain uniform distribution of water to each layer. Disc soil to thoroughly mix after water is added.
 4. Compact Earth Fill to a density of not less than **ninety-two (92)** percent in accordance with ASTM D 1557 "Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lb./sq.ft.)."
 5. Compaction by ponding and jetting shall not be permitted.
 6. Contractor shall be responsible for selection of equipment used for compaction, and for obtaining specified fill density.
 7. Costs of initial compaction tests shall be borne by the Owner. Contractor shall pay for all re-tests required due to failure of initial tests.
- E. Placing Engineered Fill:
1. Shall occur after scarification and compaction operations.
 2. Place Engineered Fill in accordance with article titled "Placing Earth Fill" within this specification section.
 3. As a minimum, extend to **five (5) feet** beyond the perimeter of the footprint of each:
 - a. Respective building area.
 - b. Exterior pavement areas.
 - c. Concrete slab areas.
 - d. Improvement structures.
 4. Preparation of sub-grade and selection and placing of Engineered Fill subject to continuous inspection and supervision of Geotechnical Engineer.

5. Compact Engineered Fill to a density of not less than **ninety-two (92)** percent, but not more than **ninety-five (95)** percent, in accordance with ASTM D 1557 "Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lb./sq.ft.)." Density of each layer of Engineered Fill shall be tested and verified that it meets required density of Geotechnical Engineer prior to placing succeeding layer.
 - a. Compact top **twelve (12) inches** of Engineered Fill a density of not less than **ninety-five (95)** percent in accordance with Test Designation ASTM D 1557 "Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lb./sq.ft.)" at:
 - 1) Dedicated fire access areas.
 - 2) Parking areas.
 - 3) Driveway areas.
 - 4) Playcourt areas.
 6. Roll Engineered Fill under interior and exterior slabs to smooth surface, free of large or sharp particles.
 7. Conduct work to minimize inspection costs.
 8. When testing agency reports that sub-grades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; re-compact and retest until specified compaction is obtained.
- F. Excavation for Formwork:
1. Excavate for footings to depth and width indicated on the drawings or within these specifications.
 2. Protect top corners of trenches against sloughing.
 3. Side forms at footings may be omitted if excavation stands without caving. Make footing trench **two (2) inches** wider than width of concrete footing indicated on the drawings, when earth is used as a form. Cut trenches true and straight. Make side cuts neat and plumb. Bottom of trenches shall be level with reasonably sharp corners.
 4. When forms are required at footings, allow additional space for construction and inspection.
 5. Provide means to accurately position and secure sill bolts, tie downs, reinforcing, and all other inserts in concrete.
 6. Footings to bear on firm soil, as determined and approved by the Geotechnical Engineer.
 7. Notify the Architect if unsuitable bearing is encountered at depths indicated. After review and approval of the Architect and Geotechnical Engineer, continue excavation.
 8. Fill trenches excavated below indicated depths on drawings with concrete to required elevations. Concrete shall be in accordance with Specification Section - CAST-IN-PLACE CONCRETE.
- G. Trenching for Piping or Conduit:
1. Cut trenches true and straight. Make sides with neat cut. Bottom of trenches shall be uniform and in conformance with laying piping.
 2. Cut trenches wide enough to provide sufficient working space.
 3. Compact bottom of trench to 92% relative compaction.
 4. Piping or conduit to bear on firm soils and fill. Notify the Architect if unsuitable bearing is encountered at depths indicated on the drawings.
 - a. Sub-Base Support: Where installation of sub-base material is indicated, excavate to depth indicated or, if not otherwise indicated, a minimum of **six (6) inches** below bottom of work to be supported.
 - b. Excavate by hand below belling so that piping bears continuously on firm soil.

5. Fill trenches excavated below required depths to required depths with Sand Fill, Earth Fill or Back Fill as required in accordance with article titled "Placing Back Fill" within this specification section.
 - a. Lean concrete shall be used as Back Fill where Utility Trenches extending from the exterior to the interior limits of building. Lean concrete shall extend a minimum distance of **two (2) feet** laterally on each side of the exterior building line and a minimum of **six (6) inches** above footing penetration.

- H. Protection of Excavations:
 1. Provide all shoring and bracing as required and those codified in local, state or federal safety regulations.
 - a. CAL/OSHA Health and Safety Standards for Excavations.
 - b. Any other successor regulations.
 2. Prevent water, caving, or sloughing from entering excavation.
 3. Maintain excavations free of water.

- I. Placing Back Fill:
 1. Remove all debris, wood, paper and deleterious materials from excavations before placing Back Fill.
 2. Do not backfill against foundation wall without Architect's approval and not until forms have been removed. Place Back Fill on each side simultaneously or brace one side.
 3. Do not Back Fill over piping until piping has been tested, inspected and approved.
 4. Place Back Fill in accordance with article titled "Placing Earth Fill" within this specification section, or in accordance with article titled "Placing Engineered Fill" within this specification section, when Back Fill occurs within limits of Engineered Fill.
 - a. Compact around the lower haunches of piping without disturbing the pipe's line and grade.
 - b. Compact the fill to **ninety-two (92)** percent minimum **twelve (12) inches** above pipe or to **twenty-four (24) inches** of required grade, whichever is greater.
 - c. Compact the remainder of the fill to **ninety-two (92)** percent minimum, or as required by surface construction.
 - d. All compaction shall be in accordance with ASTM D 1557 "Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lb./sq.ft.)."
 5. Jetting of trench backfill is not allowed.

- J. Placing Finish Fill:
 1. Remove debris subject to termite attack, rot, or corrosion and all other deleterious materials from areas to receive Finish Fill.
 2. Place Finish Fill in Landscape and Athletic Field areas only. The maximum depth allowed is **twelve (12) inches**.
 3. Place Finish Fill in maximum layers of **six (6) inches** and compact to a density of not less than **eighty-five (85)** percent in accordance with ASTM D 1557 "Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lb./sq.ft.)."

- K. Placing Gravel Back Fill at Pool Structure
 1. The material shall be placed in one foot lifts around the perimeter of the structure in such a manner that the grains naturally compact.
 2. No heavy vibratory or mechanical compaction shall occur within the aforementioned "clear zone".

3. Walk behind skid compactors or similar apparatus are permissible. Special attention should be taken to ensure the backfill does not sluff away from the panel at horizontal protrusions such as gutters, skimmer boxes, buttresses, etc.
4. Refer to Aquatics structural engineering drawings and specifications; as well as all geotechnical recommendations for other backfill and compaction procedures and requirements for the project.
5. Any conflicts between this specialized requirement and the general earthwork specifications and drawings will be brought to the attention of the engineer of record during the bidding process.
6. No perceived conflicts will be considered justification to a change to the base contract unless specifically expressed during the bidding process.
7. The installing contractor is responsible for any damage or misalignment of the panels or structure resulting from the improper installation of these specific backfill requirements

L. Grading:

1. Grade to elevations as indicated on the drawings.
2. Grading shall be reasonably smooth, compacted and free from irregular surface changes.
3. Grade ditches, swales and gutters to drain readily.
4. Slope grade evenly from proposed building pads in all directions to provide drainage.
 - a. Grades at exterior building walls shall slope away from the structure at a minimum slope of **2 percent** for a minimum of **5 feet**, in order to prevent standing water adjacent to building foundations.
5. Protect newly graded areas. Repair impairments resulting to grading from settlement or washing and re-establish grades to the required elevations and slopes.
6. All grading shall be plus or minus **0.05 foot** of the designated grade in areas to receive concrete slabs-on-grade, other concrete improvements, and asphalt concrete paving.
 - a. Finished grades in turf and planter areas shall be within plus or minus 0.05 foot of the designated grade.
7. Keep elevations of areas to be turfed **one (1) inch** below proposed adjoining walks, curbs, slabs, etc., and areas of planters **two (2) inches** below proposed improvements.
8. All grading shall be plus or minus **0.05 foot** of the designated grade in areas to receive concrete slabs-on-grade, other concrete improvements, and asphalt concrete paving.
 - a. Finished grades in turf and planter areas shall be within plus or minus **0.10 foot** of the designated grade.
9. Keep elevations of areas to be turfed **two (2) inch** below proposed adjoining walks, curbs, slabs, etc., and areas of planters **three (3) inches** below proposed improvements.

3.4 FIELD QUALITY CONTROL

A. Site Tests:

1. Required field test reports on placed fill materials. Test will be performed by the Owner's Testing Laboratory Agency in accordance with the Specification Section – TESTING LABORATORY SERVICES.
2. Testing Agency will test compaction of soils in place according to ASTM D 1556 "Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method"; ASTM D 2167 "Standard test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method"; ASTM D 2922 "Standard test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)"; and ASTM D 2937 "Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method," as applicable. Tests will be performed at the following locations and frequencies:

- a. Paved and Building Slab Areas: At sub-grade and at each compacted fill and Back Fill layer.
 - b. Foundation Wall Back Fill: At each compacted Back Fill layer.
 - c. Trench Back Fill: At each compacted initial and final Back Fill layer.
3. Costs of initial compaction tests shall be borne by the Owner. Contractor shall pay for all re-tests and re-inspection required due to failure of initial tests.

B. Inspection:

- 1. As required by Regulatory Requirements.
- 2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
- 3. No work shall be without the inspections required by Regulatory Requirements.
- 4. Testing Agency: Owner will engage a qualified independent Geotechnical Engineering testing agency to perform field quality-control testing.
- 5. Allow testing agency to inspect and test sub-grades and each fill or back fill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

3.5 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and re-compact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, back fill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.6 CLEANING

- A. Disposal of Surplus and Waste Materials:
 - 1. Remove surplus satisfactory soil material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's Property.

END OF SECTION

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SECTION 313100– SOIL TREATMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to provide Termite Control and Herbicide, and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 3. 03 30 00 CAST-IN-PLACE CONCRETE
 4. 31 00 00 OFFSITE DEVELOPMENT
 5. 31 20 00 EARTHWORK
 6. 32 12 00 PAVEMENT
 7. 32 90 00 LANDSCAPE CONSTRUCTION
 8. 33 40 00 STORM DRAINAGE
 9. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 10. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data for each type of product specified:
 - a. Include the EPA Registered Label showing the Active Ingredients and their percentages.
 2. Quality Assurance/Control Submittals:
 - a. Certificates:
 - 1) Indicating compliance with applicable regulations for all products, signed by product manufacturer.
 - 2) Installers Qualification for products specified.
 - b. Manufacturer's written Instructions for each type of product specified:
 - c. Test reports:
 - 1) Soil Treatment application.
 3. Closeout Submittals:
 - a. Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.
 - 1) Identify and accurately locate extent of treatment on the Site Plans.
 - b. Warranty in accordance with Specification Section - WARRANTIES.
 - 1) Special Warranty specified within this specification section.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Material Qualifications:
 - a. All products shall comply with all applicable EPA regulations and standards in the place where the Project is located, and in effect at the time of application.
 - b. Obtain termite control products from a single manufacturer for each product.
2. Installer Qualifications:
 - a. A specialist who is EPA approved and licensed according to regulations of authorities having jurisdiction to apply termiticides and herbicides in the jurisdiction where the project is located.

B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located
 - b. EPA Environmental Protection Agency – All Applicable Environmental Protection Regulations and Standards.
 - c. USDA United States Department of Agriculture.
 - d. All products will comply with the current EPA laws and California Rules and Regulations at the time of application. Should the products listed become unavailable because of changes in the law, submit substitute products in accordance with Section - SUBSTITUTION PROCEDURES for review by the Architect.

C. Meetings:

1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems, which may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.4 PROJECT CONDITIONS

A. Environmental requirements:

1. To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

B. Existing Conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.5 SEQUENCING AND SCHEDULING

A. Coordination:

1. Coordinate soil treatment application with excavating, filling, grading, and concrete operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

1.6 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

1. Manufacturer's standard form, signed by Applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
2. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period Five (5) Years.
 - 1) From the date of Substantial Completion.

C. Installer's Warranty:

1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.

1. Specified termiticide product manufacturer:
 - a. BAYER CORPORATION "PREMISE 75"

- b. BASF CORPORATION "TERMIDOR SC"
- c. AMVAC "WISDOM TC FLOWABLE"

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Termiticide:

1. PREMISE® 75 insecticide in water soluble packets as manufactured by BAYER CORPORATION, delivered in a minimum of a 0.1 percent solution as indicated by the label and in accordance with local environmental regulations, or approved equivalent.
 - a. Active Ingredients:
 - 1) Imidacloprid,
1-((6-Chloro-3-pyridinyl)methyl)-N-nitro-2-imidazolidinimine: 75.0 percent.
 - 2) Inert Ingredients: 25.0 percent.
 - 3) Total: 100.0 percent.
2. TERMIDOR SC Termiticide
3. /Insecticide to use at 0.06 percent - 0.125 percent finished solution. The 0.06 percent should be used in typical control situations.
 - a. Active Ingredients:
 - 1) Fipronil: 5 amino-1-(2,6 dichloro-4-(trifluoromethyl)(phenyl)-4-((1,R,S)-(trifluoromethyl) sulfinyl)-1-H-pyrazole-3-carbonitrile: 9.1 percent.
 - 2) Inert ingredients: 90.9 percent.
4. WISDOM TC Flowable use a 0.06 percent emulsion for subterranean Termites.
 - a. Active Ingredients:
 - 1) Bifenthrin: 7.9 percent.
 - 2) Other ingredients: 92.1 percent.

B. Herbicide:

1. Commercial chemical for weed control registered by the EPA and the State of California. Provide granular, liquid, or wettable powder form.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Termiticide:

1. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control.
 - a. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.
- B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticide may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
 - 1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION

- A. General:
 - 1. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.
- B. Applying Termiticide for Pre-Construction Treatment:
 - 1. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide per the soil conditions present, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticide barrier or treated zone is established around and under building construction. Distribute treatment evenly.
 - a. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
 - 1) If the slab-on-grade construction is applied directly over the vapor retarder/barrier, then apply the termiticide just under the vapor retarder/barrier just prior to its placement. Spray all penetrations on top of the vapor retarder/barrier after it is placed and sealed, and just prior to the placement of the concrete.
 - 2) If the slab-on-grade construction is applied over a sand layer laid on top of the vapor retarder/barrier, then apply the termiticide directly over the sand layer just prior to the placement of the concrete.
 - b. Foundations: Adjacent soil including soil along the entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating the slab, and around interior column footers, piers, and chimney bases; also along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
 - c. Crawlspace: Soil under and adjacent to foundations as previously indicated. Treat adjacent areas including around entrance platform, porches, and equipment bases. Apply overall treatment only where attached concrete platform and porches are on fill or ground.

- d. Masonry: Treat voids.
 - e. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.
2. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
 3. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
 4. Post warning signs in areas of application.
 5. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.
- C. Applying Termiticide for Post-Construction Treatment:
1. New construction shall always require Pre-Construction Treatment.
 2. Only if the project involves Modernization and Termiticide
 3. Treatment is required, follow product label instructions for Post-Construction Treatment.
- D. Applying Herbicide Treatment:
1. Extent of Herbicide Application: Soil under all asphaltic concrete paving, including driveways, parking areas, and athletic courts.
 2. Application:
 - a. Prepare substrate in accordance with manufacturer's written recommendations.
 - b. Apply Herbicide Solution over sub-base prior to application of asphaltic concrete.
 - c. Apply in form allowed by the EPA label.
 - d. Rate of Application: As recommended by the label.
 - e. Take all precautions to limit herbicide treatment to areas immediately under paved areas.

3.4 FIELD QUALITY CONTROL

- A. Soil Treatment Application Report: After application of soil treatment is completed, submit report for Owner's record information, including the following:
1. Date and time of application.
 2. Moisture content of soil before application.
 3. Brand name and manufacturer of termiticide.
 4. Quantity of undiluted termiticide used.
 5. Dilutions, methods, volumes, and rates of application used.
 6. Areas of application.
 7. Water source for application.

END OF SECTION

SECTION 321200 - PAVEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all pavement materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 02 49 19 SELECTIVE DEMOLITION
 - 4. 03 30 00 CAST-IN-PLACE CONCRETE
 - 5. 09 91 00 PAINTING
 - 6. 31 20 00 EARTHWORK
 - 7. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 8. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. Standards:
 - 1. In accordance with the following standards:
 - a. ASTM American Society of Testing and Materials
 - b. FS Federal Specifications
 - c. RIS Redwood Inspection Service
 - d. SSCDOT Standard Specifications, California Department of Transportation

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

- B. Product Data.
 - 1. Provide technical data and tested physical and performance properties on any products provided in PART 2.
 - a. Aggregate Base, Asphalt Concrete, Sealers, Markings, Wheel Stops, Joint Sealant.
 - 2. Submit manufacturer's full color range (including any standard and premium colors) for selection by the Architect.

- C. Samples.
 - 1. Provide 3 inch long samples of each color of Markings and Coatings.
 - 2. Provide 12 inch square sample of each Geosynthetic Interlayer.

- D. Quality Assurance/Control Submittals:
1. Design Data:
 - a. Provide Job-Mix Design for each proposed Job-Mix indicating aggregate gradation for the sieve sizes specified and the amount (percent by dry weight of aggregate) of asphalt to be used.
 2. Test Reports:
 - a. Compaction of Aggregate base test results.
 - b. In-place compacted thickness of aggregate base and asphalt paving.
 - c. Stockpiled pulverized asphalt.
 - 1) Sieve Analysis
 - 2) Maximum Density/Optimum Moisture
 - 3) Resistance Value
 3. Certificates:
 - a. Contractor's Letterhead Statement
 - b. Applicator's Letterhead Statement
 - c. Statement of installer's qualifications
- E. Closeout Submittals:
1. Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.
 2. Warranties:
 - a. Contractor's General Warranty.
 - b. Manufacturer's Warranty.
 - c. Installer's Warranty.

1.4 QUALITY ASSURANCE

- A. Qualifications:
1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 2. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
- B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
- C. Certificates:
1. Provide Contractor's Letterhead Statement certifying work provided meets or exceeds the requirements of this Section.
 2. Provide Applicator's Letterhead Statement certifying products are in accordance with the manufacturer's specifications and standards requirements.

- D. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of any construction or aggregate base rock preparation.
 - a. Coordinate the work with all other related work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
 - c. Review requirements of work performed by others that rely on substrates exposed by selective demolition work.
 - d. Review areas where existing construction is to remain and requires protection.
 - e. Review demolition waste disposal and material recycling procedures.
 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
1. Products shall be handled in such a manner as to assure that they are free from defects or other damage.
- B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, grade, source location and date of manufacture.
 2. Damaged products will not be accepted.
- C. Storage and protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.6 PROJECT CONDITIONS

- A. Environmental requirements:
1. Dust control:
 - a. Perform work in a manner as to minimize the spread of dust and flying particles.
 - b. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other work.
 2. Burning:
 - a. No burning will be allowed on-site.
 3. Rain:
 - a. Work under this section shall not be started or continue under threat of rain.
 - b. Asphalt Concrete shall not be placed when the surface is wet or frozen.

4. Temperature:
 - a. Actual selection of Asphaltic Concrete by the applicator depends on the time of the year for the application and whether or not High or Low temperature Asphaltic Concrete is used. Verify anticipated temperature ranges and verify with the Architect prior to selection.

B. Existing Conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.7 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

1. In accordance with manufacturer's written standard warranty:
 - a. Warranty period One (1) Year.

C. Installer's Warranty:

1. In accordance with the terms of the specification section - WARRANTIES, but the period of time shall be for One (1) year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 1. Specified traffic paint product manufacturer:
 - a. ENNIS TRAFFIC SAFETY SOLUTIONS Standard Dry Waterborne Traffic Paint.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Aggregate Base:

1. Three-fourths (3/4") inch grade, Class 2, in accordance with SS-CDOT Section 26, "Aggregate Bases".
- B. Primer Coat:
1. Asphaltic Emulsion:
 - a. Type SSI asphalt emulsion per SS-CDOT Section 94 "Asphaltic Emulsions" diluted with water to 5 parts water to 1 part asphaltic emulsion.
- C. Asphalt Concrete:
1. Asphalt Binder:
 - a. Type PG 64-10 per SS-CDOT Section 92 "Asphalts".
 2. Aggregate:
 - a. Type B in accordance with SS-CDOT Section 39 "Hot Mix Asphalt".
 - 1) Provide one-half inch aggregate at playcourt, tennis and basketball courts, walkways, and playground areas.
 - 2) Provide three-fourths inch aggregate at on-site parking lots, roadways, and driveways.
- D. Sealers:
1. Seal Coat:
 - a. In accordance with SS-CDOT Section 37-2• "Seal Coats" and Section 94 "Asphaltic Emulsions".
 - 1) Section 37-2.04 "Payment" is exempt from this specification.
 - b. Asphaltic emulsion shall be any of the slow-setting grades.
 - c. Water shall be potable.
 - d. Screenings shall be Fine, 1/4• max
- 2.3 ACCESSORIES
- A. Joint Sealant:
1. Hot-applied, single component, polymer-modified bituminous sealant meeting ASTM D 6690 "Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements", Type I, II, or III.
- 2.4 Crushed Stone Surfacing
- A. Decomposed Granite (DG), Vehicular Surface, ADA Accessible System:
1. Sub-grade preparation.
 2. Geotextile.
 3. Stabilizer DG
 - a. Determine soils value for vehicular, no less than 6 inches.
 - 1) Low R value: 6-7 inches
 - 2) High R value: 6 inches.
 4. Compaction.
- B. Decomposed Granite (DG), Typical and ADA Accessible System:
1. Sub-grade preparation.
 2. Geotextile.
 3. Stabilizer DG: 3-4 inches.

4. Compaction.
- C. Compaction.Decomposed Granite:
1. Decomposed Granite (DG) grading requirements:
 - a. Sieve designation, 3/8 inch: 100% passing.
 - b. Sieve designation, No. 4: 90- 100% passing.
 - c. Sieve designation, No. 8: 75-80% passing.
 - d. Sieve designation, No. 16: 55-65% passing.
 - e. Sieve designation, No. 30: 40-50% passing.
 - f. Sieve designation, No. 50: 25 - 35% passing.
 - g. Sieve designation, No. 100: 15 - 20% passing.
 - h. Sieve designation, No. 200: 10 - 15% passing.
 2. The portion of DG retained on the No. 4 sieve shall have a maximum percentage of wear of 50 at 500 revolutions as determined by AASHTO T96.
 3. The portion passing a No. 40 sieve shall have a maximum liquid limit of 25 and maximum plasticity index of 7 as determined by AASHTO T89 and AASHTO T90, respectively.
 4. DG to be used for pathways and non-vehicular areas may be 1/4" minus sieve size at the above gradation.
 5. Crushed aggregate screenings shall be free from clay lumps, vegetative matter, and deleterious material.
 6. DG shall be gray in color.
- D. Soil Binder:
1. Binder shall be non-toxic, colorless, odorless, organic powder that binds DG screenings, similar to "Stabilizer" as manufactured by STABILIZER SOLUTIONS INC.
- E. Geotextile Fabric:
1. Spun, non-degrading geotextile fabric that blocks weed growth and is permeable to air and water, minimum weight of 3.0 oz/sy, TYPAR "Professional Landscape Fabric" or equivalent.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
 - a. Verify subgrade has been compacted to relative compaction required and is within allowable moisture content.
 - b. Verify gradients and elevations of base are correct.
 - c. Verify stockpiled pulverized asphalt is suitable for using as Class 2 aggregate base by reviewing test reports.
 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Coordination:
 - 1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
 - 2. Do not begin work until sub-grade is in a condition satisfactory to the Geotechnical Engineer.
- B. Protection:
 - 1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
- C. Surface preparation:
 - 1. Completely proof-roll subgrade and/or aggregate base to identify soft pockets and areas of excess yielding.
 - a. Do not proof-roll when wet or saturated conditions exist.
 - b. Excavate soft spots, unsatisfactory subgrade or base, and areas of excessive pumping or rutting and replace with compacted backfill per Specification Section - EARTHWORK or Aggregate Base.
 - 2. Coordinate with Specification Section - SOIL TREATMENT for application of herbicides.
 - 3. Prepare surface in accordance with manufacturer's written instructions and recommendations.
 - 4. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
 - 5. Clean existing pavement surface of loose and deleterious material.
 - 6. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.
 - a. Mill to a depth of 1-1/2 inches.
 - b. Mill to a uniform finished surface free of excessive gouges, grooves, and ridges.
 - c. Control rate of milling to prevent tearing of existing asphalt course.
 - d. Repair or replace curbs, manholes, and other construction damaged during cold milling.
 - e. Keep milled pavement surface free of loose material and dust.

3.3 INSTALLATION

- A. General:
 - 1. In accordance with manufacturer's instructions and recommendations unless specifically noted otherwise.
 - 2. In accordance with approved submittals.
 - 3. In accordance with Regulatory Requirements.
 - 4. Refer to Civil Drawings for Paving Section details and related notes and details.
- B. Layout:
 - 1. Lines shall be straight and true.
- C. New Pavement:
 - 1. Aggregate Base:

- a. Install Aggregate Base over approved sub-grade.
 - b. Thickness shall be as indicated.
 - c. Compaction of each layer shall be not less than 95 percent as determined by Caltrans California Test Method No. 216 "Method of Test for Relative Compaction of Untreated and Treated Soils and Aggregates", in accordance with SS-CDOT.
 - d. Recycled Asphalt as Aggregate Base:
 - 1) Remove deleterious debris, organics and pieces larger than 3 inches encountered within the stockpile before placement.
2. Asphaltic Concrete paving:
- a. Contact Geotechnical Engineer 72 hours prior to installation.
 - b. Thickness shall be as indicated.
 - 1) Where thickness exceeds 2 inches, place in no less than two layers.
 - c. Compaction Equipment:
 - 1) In accordance with SS-CDOT Section 39 "Hot Mix Asphalt". At small difficult areas, equipment may be altered as approved by the Geotechnical Engineer.
 - d. The completed surface shall be thoroughly compacted, free from ruts, depressions, and irregularities, and be true to grade, slope and cross-section so that no standing water occurs.
 - e. Tolerances:
 - 1) Flatness: Maximum variation of ¼ inch measured with a 12 foot straight edge.
 - 2) Thickness: Not less than specified thickness.
- D. Refinish Pavement:
1. Crack and Joint Filling:
 - a. Clean cracks and joints in existing asphalt concrete pavement.
 - b. Use tack coat asphaltic emulsion to seal cracks and joints less than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
 - c. Use Joint Sealant to seal cracks and joints more than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
- E. Reconstruct Pavement:
1. Crack and Joint Filling:
 - a. Clean cracks and joints in existing asphalt concrete pavement.
 - b. Use tack coat asphaltic emulsion to seal cracks and joints less than ¼ inch wide. Fill flush with surface of existing pavement and remove excess.
 - c. Use Joint Sealant to seal cracks and joints more than ¼ inch wide. Fill flush with surface of existing pavement and remove excess.
 2. Aggregate Base:
 - a. Install Aggregate Base over approved sub-grade.
 - b. Thickness shall be as indicated.
 - c. Compaction of each layer shall be not less than 95 percent as determined by Caltrans California Test Method No. 216 "Method of Test for Relative Compaction of Untreated and Treated Soils and Aggregates", in accordance with SS-CDOT.
 3. Asphaltic Concrete paving:
 - a. Contact Geotechnical Engineer 72 hours prior to installation.
 - b. Thickness shall be as indicated.
 - 1) Where thickness exceeds 2 inches, place in no less than two layers.
 - c. Compaction Equipment:

- 1) In accordance with SS-CDOT Section 39 "Hot Mix Asphalt". At small difficult areas, equipment may be altered as approved by the Geotechnical Engineer.
- d. The completed surface shall be thoroughly compacted, free from ruts, depressions, and irregularities, and be true to grade, slope and cross-section so that no standing water occurs.
- e. Tolerances:
 - 1) Flatness: Maximum variation of ¼ inch measured with a 12 foot straight edge.
 - 2) Thickness: Not less than specified thickness.

F. Patching:

1. Crack and Joint Filling:
 - a. Clean cracks and joints in existing asphalt concrete pavement.
 - b. Use tack coat asphaltic emulsion to seal cracks and joints less than ¼ inch wide. Fill flush with surface of existing pavement and remove excess.
 - c. Use Joint Sealant to seal cracks and joints more than ¼ inch wide. Fill flush with surface of existing pavement and remove excess.
2. Aggregate Base:
 - a. Install Aggregate Base over approved sub-grade.
 - b. Thickness shall be as indicated.
 - c. Compaction of each layer shall be not less than 95 percent as determined by Caltrans California Test Method No. 216 "Method of Test for Relative Compaction of Untreated and Treated Soils and Aggregates", in accordance with SS-CDOT.
3. Asphaltic Concrete paving:
 - a. Contact Geotechnical Engineer 72 hours prior to installation.
 - b. Thickness shall be as indicated.
 - 1) Where thickness exceeds 2 inches, place in no less than two layers.
 - c. Compaction Equipment:
 - 1) In accordance with SS-CDOT Section 39 "Hot Mix Asphalt". At small difficult areas, equipment may be altered as approved by the Geotechnical Engineer.
 - d. The completed surface shall be thoroughly compacted, free from ruts, depressions, and irregularities, and be true to grade, slope and cross-section so that no standing water occurs.
 - e. Tolerances:
 - 1) Flatness: Maximum variation of 1/4 inch measured with a 12 foot straight edge.
 - 2) Thickness: Not less than specified thickness.

G. Wheel Stops:

1. Securely attach Wheel Stops to pavement with not less than two dowels embedded at one-quarter to one-third points after all products have been applied to finished surface. Securely install dowels into pavement and bond to wheel stop. Recess head of dowel beneath top of wheel stop.

3.4 APPLICATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
 2. In accordance with approved submittals.
 3. In accordance with Regulatory Requirements.
 4. Set plumb, level, and square.
- B. Layout:
1. Lines shall be straight and true.
- C. New Pavement:
1. Sealers:
 - a. Allow Asphaltic Concrete to cure 21 days minimum.
 - b. Broom clean asphaltic concrete.
 - c. Apply in accordance with SS-CDOT Section 37 "Bituminous Seals"•
 - d. The finished surface shall be smooth and uniform in appearance.
- D. Refinish Pavement:
1. Sealers:
 - a. Allow Asphaltic Concrete at patch conditions to cure 21 days minimum.
 - b. Broom clean asphaltic concrete.
 - c. Apply in accordance with SS-CDOT Section 37 "Bituminous Seals"•
 - d. The finished surface shall be smooth and uniform in appearance.
 - e. Sealer type:
 - 1) Apply Seal Coat where indicated at the application rate of 0.15-0.30 gal/sq. yd for fine screenings.
 - a) Spread screenings before asphaltic emulsion begins to set.
- E. Reconstruct Pavement:
1. Sealers:
 - a. Allow Asphaltic Concrete to cure 21 days minimum.
 - b. Broom clean asphaltic concrete.
 - c. Apply in accordance with SS-CDOT Section 37 "Bituminous Seals"•
 - d. The finished surface shall be smooth and uniform in appearance.
- F. Patch Pavement:
1. Sealers:
 - a. Allow Asphaltic Concrete to cure 21 days minimum.
 - b. Broom clean asphaltic concrete.
 - c. Apply in accordance with SS-CDOT Section 37 "Bituminous Seals"•
 - d. The finished surface shall be smooth and uniform in appearance.
 - e. The new asphalt concrete shall be flush with adjacent existing pavement.
- G. Markings:
1. Allow Asphalt Concrete and Seal coats to cure per manufacturers recommendations before applying paint.
 2. Sweep and clean surface to eliminate loose material and dust.
 3. Apply uniform, straight, and true markings with equipment designed for pavement markings. Edges and ends shall be sharp and clean
 4. Apply with a minimum dry film thickness of 15 mils.
 5. Colors, lengths, and widths as indicated.
 - a. Width Tolerance shall be plus or minus 1/8 inch.

6. Allow markings to dry at least the minimum time specified by the applicable paint standard and not less than that recommended by the manufacturer.

3.5 REPAIR

A. Markings:

1. Remove and replace markings that are applied at less than minimum material rates, deviate from true alignment, exceed length and width tolerances, or show light spots, smears, or other deficiencies.
2. When removing markings avoid damage to the surface which the marking was applied. Use carefully controlled sand blasting, approved grinding equipment, or other approved method.

3.6 Crushed Stone Surfacing

A. Subgrade and Decomposed Granite Preparation and Compaction:

1. Subgrade under DG shall be scarified to a minimum depth of 12", graded and compacted to 95% (+2%) relative compaction.
2. After subgrade preparation and just prior to the geotextile installation, sterilize subgrade receiving DG surfacing.
3. Install permeable geotextile fabric over treated subgrade or base. Overlap seams a minimum of 4 inches.
4. The finish grade shall be even between the headers with no humps or depressions greater than 0.25" after compaction.

B. Soil Stabilizer and Decomposed Granite Installation.

1. Soil stabilizer shall be thoroughly blended with the DG screenings prior to installation.
 - a. The stabilizer shall be mixed at a minimum rate of 15 lbs stabilizer product per ton of DG screenings.
 - b. Mix stabilizer product in accordance with manufacturer instructions.
 - c. Drop spreading of the Stabilizer product over raked DG screenings and mixing stabilizer by rototilling is NOT ACCEPTABLE.
 - d. Place the premixed stabilizer product on the desired subgrade in maximum 2" lifts. Rake smooth to the desired grade and cross slope not to exceed 2%.
 - e. After placement and raking, water the stabilized DG to achieve full depth moisture penetration of the placed product. A one-hour rate of 20gpm per 1,000 sf should achieve the proper full depth moisture penetration.
 - f. While the stabilized DG is still thoroughly moist, roll the material with a heavy lawn roller, approximately 1000 to 3000 pounds, maximum 30" wide, to achieve finish grade and initial compaction. Utilize a hand tamp at edges, around benches, and sign posts. Do not use a wacker or vibratory roller or mechanical methods to compact the stabilized DG.
 - g. Finished surface elevation: Compacted finish surface of DG shall be flush with adjacent hardscape, unless otherwise indicated.
 - h. Allow the finished surface sufficient time to dry prior to use.

C. Cleanup:

1. After all stabilization operations are completed, remove trash, excess materials, empty containers and rubbish from the property. All scars, ruts or otehr marks on the ground caused by this work shall be repaired ans the ground left in a smooth condition throughout the site.
2. The DG surface shall be dragged and a final dressing performed within 48 hours prior to final acceptance.
3. Contractor shall notify Owner's Representative that landscape irrigation shall be restricted near stabilized DG until drying period is complete.
4. Standing water on surface and adjacent path shall be restricted at all times.

D. Maintenance:

1. Remove debris, such as paper, grass clippings, or organic material by mechanically blowing or hand raking as needed.
2. If surface material exceeds a quarter inch, redistribute over entire surface. Water to 1" depth and compact with power roller no less than 1000 lbs. Repeat as needed. If cracking occurs, sweep fines into cracks, water thoroughly, and hand tamp with an 8" to 10" hand tamp.
3. District to maintain Stabilized DG in accordance with ADA Access.

E. Repairs:

1. Excavate damaged area to the depth of the stabilized DG and square off sidewalls.
2. If area is dry, moisten damaged portion lightly.
3. Pre-blend the dry required amount of Stabilizer with proper amount of aggregate in a concrete mixer.
4. Add water to the pre-blended stabilized DG. Thoroughly moisten mix with 25 to 45 gallons per 1-ton of pre-blended material or to approximately 10% moisture content.
5. Apply moistened pre-blended stabilized DG to excavated area to finish grade.
6. Compact with an 8" to 10" hand tamp or 250 - 300 pound roller. Keep traffic off areas for 12 to 48 hours after repair has been completed.

F. FIELD QUALITY CONTROL

G. Site Tests:

1. As required by local jurisdiction for off-site development.
2. Compaction of aggregate base:
 - a. Per CAL Test Method 216-00 "Method of Test for Relative Compaction of Untreated and Treated Soils and Aggregates".
3. In-place compacted thickness:
 - a. Core and measure thickness of aggregate base and asphalt paving per ASTM D 3549 "Standard Test Method for Thickness of Height of compacted Bituminous Paving Mixture Specimens"•
 - b. Core and measure at high and low elevation points of each road section and parking lot.
4. Stockpiled pulverized asphalt as aggregate base:
 - a. Sieve Analysis shall be performed per ASTM C 136 "Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates".
 - b. Maximum Density /Optimum Moisture per CAL Test Method 216-00 "Method of Test for Relative Compaction of Untreated and Treated Soils and Aggregates".
 - c. Resistance Value per CAL Test Method 301• "Method of Test for Determining the Resistance "R" Value of Treated and Untreated Bases, Subbases and Basement Soils by the Stabilometer".

- H. Inspection:
1. As required by local jurisdiction for off-site development.
 2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
 3. No work shall be done without the inspections required.

3.7 CLEANING

- A. Clean in accordance with Specification Section - TEMPORARY FACILITIES AND CONTROLS.
1. Clean any soiled surfaces immediately.
 2. In accordance with manufacturer's instructions and recommendations.

3.8 PROTECTION

- A. Protection from traffic:
1. No traffic shall occur over pavement until all materials have fully cured.
 2. Maintain in a manner acceptable to manufacturer and installer.
 3. Provide barricades, warning signs, and flags as necessary to prevent traffic crossing newly applied materials.
 4. Maintain and protect installed improvements without damage or deterioration until execution of Substantial Completion.

END OF SECTION

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SECTION 32 1313-CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Driveways.
- 2. Parking lots.
- 3. Vee Gutters (In traffic areas)
- 4. Walks (In traffic areas)

B. Related Sections:

- 1. Section 03 3000 "Cast-in-Place Concrete" for general building applications of concrete.
- 2. Section 32 1373 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

B. Other Action Submittals:

- 1. Design Mixtures: For each concrete mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified ready-mix concrete manufacturer.

B. Material Certificates: For the following, from manufacturer:

- 1. Cementitious materials.

2. Steel reinforcement and reinforcement accessories.
3. Admixtures.
4. Curing compounds.
5. Joint fillers.

C. Material Test Reports: For each of the following:

1. Aggregates.

1.5 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

B. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.

C. ACI Publications: Comply with ACI 301 unless otherwise indicated.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 55 degrees F for water-based materials, and not exceeding 95 degrees F.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less. Do not use notched and bent forms.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- B. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
- D. Zinc Repair Material: ASTM A 780.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150, gray portland cement Type II.
 - a. Fly Ash: ASTM C 618, Class F (Class C is not permitted).
- B. Normal-Weight Aggregates: ASTM C 33, uniformly graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: 1 inch nominal for slabs 4-inch thick or less and 1-1/2 inches nominal for slabs greater than 4 inches thick.
 - 2. **Contractor is notified that reducing aggregate size to make placement easier will increase shrinkage cracking.**
 - 3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: Potable and complying with ASTM C 94/C 94M.
- D. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.

6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.4 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
 1. Contractor is responsible for verifying that all curing compounds comply with the VOC Emission requirement of the San Joaquin Valley Air Pollution Control District.
 2. Shall not discolor concrete or other material and shall not leave an oily residue.
 3. Shall afford moisture loss not greater than 0.055 grams/cm² at minimum average of 300 square feet.

2.5 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber in preformed strips.

2.6 PAVEMENT MARKINGS

- A. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than three minutes. It shall be the Contractor's responsibility to verify that all paint compounds used comply with the VOC Emission requirements of the San Joaquin Valley Air Pollution Control District.
 1. Color: As indicated on drawings.

2.7 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
 1. A registered civil or structural engineer, licensed in California, with experience in concrete mix design shall select the relative amounts of ingredients to be used as basic proportions of the concrete mixes proposed for use.

- a. Mix design submittals shall include the engineer's stamp and signature. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
 2. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
 3. Field experience records shall have been obtained within the previous 12 months and span a period of at least 60 calendar days.
 4. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that meet or exceed requirements.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
1. Where Classes of Concrete are noted on the drawings, the required cementitious content shall be as follows:
 - a. Class 2 Concrete shall contain not less than 590 pounds of cementitious material per cubic yard with 1-1/2 inch maximum aggregate grading. Mix shall have a 4 inch maximum slump with a minimum 28 day compressive strength of 4,000 pounds per square inch and a minimum Modulus of Rupture of 550 pounds per square inch.
 - b. Class 3 Concrete shall contain not less than 505 pounds of cementitious material per cubic yard with 1-inch maximum aggregate grading. Mix shall have a 5 inch maximum slump with a minimum 28 day compressive strength of 2,500 pounds per square inch.
 - c. Class 4 Concrete shall contain not less than 420 pounds of cementitious material per cubic yard with 1-inch maximum aggregate gradation. Mix shall have a 5 inch maximum slump with a minimum 28 day compressive strength of 2,500 pounds per square inch.
 2. Where indicated on the drawings, provide concrete with strength, aggregate, slump and water-cementitious material ratio as noted.
 3. For miscellaneous concrete and/or where not noted on the drawings, concrete shall be Class 3.
- C. Unless otherwise approved by the Architect, maximum Water-Cementitious Materials Ratio: 0.50.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing admixture or water-reducing and retarding admixture as required for placement and workability.

2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
- F. Cementitious Materials: A minimum of 85 percent (by weight) of the cementitious material used in the mix design for shall be Type II Portland Cement. Up to 15 percent (by weight) of the cementitious material used in the mix design may be Class F Fly Ash.

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.
- B. Cold Weather Requirements:
1. Adequate equipment shall be provided for heating concrete materials and protecting concrete during freezing or near-freezing weather. All concrete materials and all reinforcement, forms, fillers, and ground with which concrete is to come in contact shall be free from frost. Frozen materials or materials containing ice shall not be used.
 2. When mixing concrete during freezing or near-freezing weather, the mix shall have a temperature of at least 50°F., but not more than 90°F. The concrete shall be maintained at a temperature of at least 50°F. for not less than 72 hours after placing. When necessary, concrete materials shall be heated before mixing. Special precautions shall be taken for the protection of transit-mixed concrete.
- C. Hot Weather Requirements
1. During hot weather, proper attention shall be given to ingredients, production methods, handling placing, protection and curing to prevent excessive concrete temperatures or water evaporation that may impair required strength or serviceability of the slab, member or structure.
 2. When air temperature is between 85 and 90°F., reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90°F., reduce mixing and delivery time to 60 minutes.
 3. Concrete Temperature: 90°F maximum at time of placement.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

- B. Identify soft pockets and excess yielding below walks, curbs/gutters, drive approaches and concrete paving. Correct subbase with soft spots and areas of pumping or rutting according to requirements in Section 31 2000 "Earth Moving."
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
 - 1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
 - 1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.

2. Provide tie bars at sides of paving strips where indicated.
 3. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
 4. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips where indicated.
1. Extend joint fillers full width and depth of joint.
 2. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
 3. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 4. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 5. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Control Joints: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of control joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.
 - a. Tolerance: Ensure that grooved joints are within 3 inches either way from centers of dowels.
 2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
 - a. Tolerance: Ensure that sawed joints are within 3 inches either way from centers of dowels.
 3. Doweled Control Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.
- B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement and dowels joint devices.
- H. Screed paving surface with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.
- K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.
 - 1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.
- L. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:

1. When air temperature has fallen to or is expected to fall below 40 degrees F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F and not more than 80 degrees F at point of placement.
 2. Do not use frozen materials or materials containing ice or snow.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- M. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below 90 degrees F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
 2. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

- D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period using cover material and waterproof tape.
 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.9 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
1. Elevation: 1/4 inch.
 2. Thickness: Plus 3/8 inch, minus 1/4 inch.
 3. Surface: Gap below 10-foot-long, unlevelled straightedge not to exceed 1/2 inch.
 4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
 5. Lateral Alignment and Spacing of Dowels: 1 inch.
 6. Vertical Alignment of Dowels: 1/4 inch.
 7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
 8. Joint Spacing: 3 inches.
 9. Contraction Joint Depth: Plus 1/4 inch, no minus.
 10. Joint Width: Plus 1/8 inch, no minus.

3.10 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow concrete paving to cure for a minimum of 28 days and be dry before starting pavement marking.

- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
 - 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to concrete surface. Mask an extended area beyond edges of each stencil to prevent paint application beyond stencil. Apply paint so that it cannot run beneath stencil.

3.11 WHEEL STOPS

- A. Securely attach wheel stops to paving with not less than two steel dowels located at one-quarter to one-third points. Install dowels in drilled holes in the paving and bond dowels to wheel stop. Recess head of dowel beneath top of wheel stop.

3.12 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain at least one composite sample for each 5000 sq. ft. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 degrees F and below and when it is 80 degrees F and above, and one test for each composite sample.
 - 5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
 - 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

- C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- G. Concrete paving will be considered defective if it does not pass tests and inspections.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- I. Prepare test and inspection reports.

3.13 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.
- E. Additional construction, testing, and replacement costs resulting from damaged or improperly installed pavement shall be paid for by the Contractor.

END OF SECTION 32 1313

SECTION 321314 - MISCELLANEOUS CONCRETE FLATWORK AND SITE WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. SSCDOT – Section 40 “Portland Cement Concrete Pavement” and Section 90 “Portland Cement Concrete” of the Standard Specifications, State of California, Department of Transportation (Caltrans) latest edition, except references to method of payment, and references to any state furnished materials.

1.2 SUMMARY

- A. Section Includes:
 - 1. Accessible Ramps.
 - 2. Curbs and gutters.
 - 3. Walks outside traffic areas.
 - 4. Vee-Gutters and walks in traffic areas except for Concrete Mixture. Concrete mixture shall meet the requirements of Class 2 of Division 32 Section “Concrete Paving”.
- B. Related Sections:
 - 1. Division 32 Section "Concrete Paving" for Class 2 concrete requirements.
 - 2. Division 32 Section "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.
- C. All improvements within property owned by a City, County, or State Entity shall be in accordance with the Standards and Specifications of the authority having jurisdiction.

1.3 DEFINITIONS

- A. Cementitious Materials: Type II gray Portland Cement conforming to the specifications of ASTM C150-02a and the requirements of Caltrans Specification Section 90 for “Type II Modified” portland cement.

1.4 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 55 deg F for water-based materials, and not exceeding 95 deg F .

PART 2 - PRODUCTS

2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
 - 1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less. Do not use notched and bent forms.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 ; deformed. At the Contractor’s option all Number 4 and smaller deformed bars may be **Grade 40** unless noted otherwise on the Drawings.
- B. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar

supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
- D. Zinc Repair Material: ASTM A 780.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
1. Portland Cement: Type II gray Portland Cement conforming to the specifications of ASTM C150-02a and the requirements of Caltrans Specification Section 90 for "Type II Modified" Portland Cement.
- B. Normal-Weight Aggregates: ASTM C 33, uniformly graded. Provide aggregates from a single source.
1. Maximum Coarse-Aggregate Size: 1 inch nominal.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- D. Water: Potable and complying with ASTM C 94/C 94M.

2.4 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

- B. Water: Potable.
- C. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
- D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating. It shall be the Contractor's responsibility to verify that all curing compounds used comply with the VOC Emission requirements of the San Joaquin Valley Air Pollution Control District.

2.5 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber in preformed strips.

2.6 DETECTIBLE WARNING MATERIALS

- A. American with Disabilities Act (ADA) Tactile Warning Surfaces shall be installed where shown on the Drawings. Installation shall be in accordance with 2018 Caltrans Standard Plans A88A. Concrete in locations to receive tactile surfaces shall be blocked out in such a way that the tactile surface will be flush with the adjacent concrete upon installation.

2.7 PAVEMENT MARKINGS

- A. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than three minutes. It shall be the Contractor's responsibility to verify that all paint compounds used comply with the VOC Emission requirements of the San Joaquin Valley Air Pollution Control District.

1. Color: As noted on the Drawings.

2.8 WHEEL STOPS

- A. Wheel Stops: Precast, 2500-psi minimum compressive strength, 6 inches high by 9 inches wide by 48 inches long. Provide chamfered corners and drainage slots on underside and holes for anchoring to substrate.

1. Dowels: No. 5 Rebar, 18-inch minimum length.

2.9 CONCRETE MIXTURES

- A. Concrete shall be Class 3 (Previous years denoted as Class B) and shall contain 505 pounds minimum of Portland Cement per cubic yard conforming to the requirements of Section 90 of the Caltrans Specifications unless noted otherwise on the drawings. Vee-Gutters and concrete walkways in vehicle areas shall meet the requirements of Class 2 Concrete as noted in Division 32 Section "Concrete Paving."
1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
 2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that meet or exceed requirements.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
1. Compressive Strength (28 Days): 2500 psi minimum.
 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.58.
 3. Slump Limit: 5 inches maximum.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. Cementitious Materials: Type II gray Portland Cement conforming to the specifications of ASTM C150-02a and the requirements of Caltrans Specification Section 90 for "Type II Modified" portland cement.

2.10 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.
1. When air temperature is between 85 and 90 deg F , reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F , reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
 - 1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated on the Drawings.
 - 1. Locate expansion joints at intervals noted on the Drawings.
 - 2. Extend joint fillers full width and depth of joint.
 - 3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
 - 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.

5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
1. Grooved Joints: Form 1/4 inch wide contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius unless noted otherwise on the Drawings. Repeat grooving of contraction joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.
- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius unless noted otherwise on the Drawings. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.5 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation and items to be embedded or cast-in.
- B. Remove snow, ice, or frost from subbase surface before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies or side forms. Use only square-faced shovels for hand spreading and consolidation.
- H. Screed paving surface with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.
- K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.
1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.
- L. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
1. When air temperature has fallen to or is expected to fall below 40 deg F , uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 2. Do not use frozen materials or materials containing ice or snow.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- M. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 3. Fog-spray forms and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.6 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 - 1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.7 DETECTABLE WARNINGS

- A. Blockouts: Form blockouts in concrete for installation of detectable warning surfaces as specified in this Section.
 - 1. Tolerance for Opening Size: Plus 1/8 inch , no minus.

3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound or a combination of these as follows:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.

- c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.9 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
 1. Elevation: 1/4 inch .
 2. Thickness: Plus 3/8 inch , no minus .
 3. Surface: Gap below 10-foot- long, unlevelled straightedge not to exceed 1/4 inch .
 4. Joint Spacing: 3 inches .
 5. Contraction Joint Depth: Plus 1/4 inch , no minus.
 6. Joint Width for Grooved Joints: Plus 1/8 inch , no minus.

3.10 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow concrete paving to cure for a minimum of 28 days and be dry before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils .
 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to concrete surface. Mask an extended area beyond edges of each stencil to prevent paint application beyond stencil. Apply paint so that it cannot run beneath stencil.

3.11 WHEEL STOPS

- A. Install wheel stops in bed of adhesive applied as recommended by manufacturer.
- B. Securely attach wheel stops to paving with not less than two No. 5 rebar dowell one-quarter to one-third points. Install dowels in drilled holes in the paving and bond dowels to wheel stop. Recess head of dowel beneath top of wheel stop.

3.12 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.
- B. Additional construction, testing, and replacement costs resulting from damaged or improperly installed infrastructure shall be paid for by the Contractor.
- C. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- D. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- E. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321314

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SECTION 32 1373-CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Cold-applied joint sealants.
- 2. Joint-sealant backer materials.

B. Related Requirements:

- 1. Section 07 9200 "Joint Sealants" for sealing non-traffic and traffic joints in locations not specified in this Section.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.6 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:

- 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 degrees F.

2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.2 COLD-APPLIED JOINT SEALANTS

- A. Single Component, Pourable, Urethane, Elastomeric Joint Sealant: ASTM C 920, Type S, Grade P, Class 25, for Use T.
 1. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. W.R. Meadows "POURTHANE SL"
 - b. Pecora Corporation "Urexpan NR-201".

2.3 JOINT-SEALANT BACKER MATERIALS

- A. Joint-Sealant Backer Materials: Non-staining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by joint-sealant manufacturer, based on field experience and laboratory testing.
- B. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

- A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions.
- C. Install joint-sealant backings to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of joint-sealant backings.
 - 2. Do not stretch, twist, puncture, or tear joint-sealant backings.
 - 3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

- D. Install joint sealants immediately following backing installation, using proven techniques that comply with the following:
 - 1. Place joint sealants so they fully contact joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

- E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:
 - 1. Remove excess joint sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING AND PROTECTION

- A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.

- B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

3.5 PAVING-JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Joints within concrete paving.
 - 1. Joint Location:
 - a. Expansion and isolation joints in concrete paving.
 - b. Contraction joints in concrete paving.
 - c. Other joints as indicated.

 - 2. Joint Sealant: Single component, pourable, urethane, elastomeric joint sealant.

3. Joint-Sealant Color: Manufacturer's standard.
- B. Joint-Sealant Application: Joints within concrete paving and between concrete and asphalt paving.
1. Joint Location:
 - a. Joints between concrete and asphalt paving.
 - b. Other joints as indicated.
 2. Joint-Sealant Color: Manufacturer's standard.

END OF SECTION 32 1373

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SECTION 32 15 40 - CRUSHED STONE SURFACING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnish and install decomposed granite surfacing which includes:

1. Sub-grade Preparation
2. Base Preparation
3. Edge restraint
4. Stabilizer
5. Compaction
6. Cleanup

B. Related work:

1. Section 312200: Earthwork
2. Section 312222: Soil Materials
3. Section 321216: Soil Sterilization
4. Section 321126: Aggregate Base

C. Definitions: The word Architect as used herein shall refer to the Landscape Architect or the Owner's authorized representative.

1.2 SUBMITTALS:

- A. Procedure: Submittals shall be provided in accordance with Division 1 requirements.
- B. Submit aggregate sieve analysis, product specifications and a one pint representative sample of the proposed decomposed granite, with named source.

PART 2 – PRODUCTS

2.1 DECOMPOSED GRANITE

A. Decomposed granite is referred to by the abbreviation (D.G.), or referred to as disintegrated granite. All decomposed granite for non-vehicular surfaces shall conform to the following grading requirements:

Sieve Designation	% Passing
3/8 inch	100
No. 4	90-100
No. 8	75-80
No. 16	55-65
No. 30	40-50
No. 50	25-35

Sieve Designation	% Passing
No. 100	15-20
No. 200	10-15

B. All decomposed granite for vehicular surfaces shall conform to the following grading requirements:

Sieve Designation	% Passing
1/2 inch	95-100
3/8 inch	90-95
No. 4	65-80
No. 8	43-63
No. 16	40-49
No. 30	30-40
No. 50	20-27
No. 100	10-18
No. 200	10-12

C. The portion of D.G retained on the no. 4 sieve shall have a maximum percentage of wear of 50 at 500 revolutions as determined by AASHTO T96.

D. The portion passing a No. 40 sieve shall have a maximum liquid limit of 25 and maximum plasticity index of 7 as determined by AASHTO T89 and AASHTO T90, respectively.

E. The sand equivalent shall be in the range of 35-55. The R-value shall be a minimum of 71.

F. Crushed aggregate screenings shall be free from clay lumps, vegetative matter and deleterious material.

G. D.G. shall be tan or buff [grey] in color.

2.2 SOIL BINDER

A. Binder shall be a non-toxic, colorless, odorless, organic powder that binds D.G. screenings consisting of 95% Psyllium with a minimum 70% Mucilliod content. The binder shall be "Stabilizer" as manufactured by Stabilizer Solutions Inc., (800) 336-2468, FAX: (602) 225-5902, or equal.

2.3 EDGING

A. Aluminum edging: 3/16" x 5 1/2", manufactured from 6063 extruded aluminum alloy of T-6 hardness with interlock system and 5 stake punch outs fabricated in each strip. Stakes 12" long, lock 1/2" below top of edging.

1. Finish: Black anodized

2.3 GEOTEXTILE FABRIC

- A. Spun, non-degrading geotextile fabric that blocks weed growth and is permeable to air and water, minimum weight of 3.0 oz/sy, TYPAR "Professional Landscape Fabric" or equivalent.

PART 3 – EXECUTION

3.1 SUBGRADE AND DECOMPOSED GRANITE PREPARATION AND COMPACTION

- A. Subgrade under all D.G. shall be overexcavated to a minimum of 18" below existing grade and scarified to a minimum depth of 8", graded and compacted to 90% relative compaction.
- B. Aggregate base under D.G. surfacing shall be in conformance with Section.
- C. After subgrade preparation or base installation, sterilize base or subgrade receiving D.G. surfacing per Section 321216.
- D. Minimum compaction for pedestrian use D.G. surfaces shall be 85% relative density, and 90% relative density for vehicular use. The Contractor shall provide one compaction test for every 2,000 square feet or fraction thereof.
- E. The finish grade shall be even between the headers with no humps or depressions greater than +/- 0.25" after the compaction.

3.2 SOIL STABILIZER AND DECOMPOSED GRANITE INSTALLATION

- A. Soil stabilizer shall be thoroughly mechanically blended per the manufacturer's recommendations with the D.G. screenings prior to transport to the job site.
 1. For vehicular and/or pedestrian use, the stabilizer shall be mixed at a minimum rate of 15 lbs. of Stabilizer product per ton of D.G. aggregate.
 2. For tree well use, the stabilizer shall be mixed at a minimum rate of 8 lbs. of Stabilizer product per ton of DG aggregate.
 3. Premixed Stabilizer and D.G. material can be obtained locally by contacting the stabilizer manufacturer and obtaining the location of a local vendor.
 4. Drop spreading of the Stabilizer product over raked D.G. screenings and mixing stabilizer by rototilling is NOT ACCEPTABLE.
- B. Place the premixed stabilizer product on the pre-soaked subgrade in maximum 2" lifts. Rake smooth to the desired grade and cross slope.
- C. After placement and raking, water the Stabilized D.G. to achieve full depth moisture penetration of the placed product. Apply 25 – 45 gallons per ton to achieve the proper full depth moisture penetration.

D. After 6 – 72 hours for activation, roll the Stabilized D.G material with a 2 to 5 ton double drum roller to achieve finish grade and initial compaction without separation, plowing or any other physical compromise of the aggregate. Utilize a hand tamp at edges, around benches, and sign posts. Do not use a vibratory wacker plate or vibratory roller to compact the Stabilized D.G.

E. Finish surface elevation:

1. Compacted finish surface of DG shall be flush with headers, paving, mowstrips and/or curbs, unless otherwise indicated.
2. Compacted finish surface of DG shall be two inches above finish grade in adjacent shrub/ground cover planting areas, unless otherwise indicated.
3. Compacted finish surface of DG shall be one-half inch above finish grade in adjacent sodded turfgrass planting areas, unless otherwise indicated.
4. Compacted finish surface of DG shall be flush to finish grade in adjacent seeded or sprigged turfgrass planting areas, unless otherwise indicated.

F. Lightly spray the surface after compaction operations. Allow the finished surface sufficient time to dry prior to use.

G. Finished surface shall be smooth, uniform and solid with no evidence of chipping or cracking. Cured and compacted pathway shall be firm throughout profile with no spongy areas. Loose material shall not be present on surface after installation, but may appear after use and according to environmental conditions. Pathway shall remain stable underneath loose granite on top with a “natural” look. Any significant irregularities in path surface shall be repaired to the uniformity of entire installation.

3.3 CLEANUP

A. After all stabilization operations are completed, remove trash, excess materials, empty containers and rubbish from the property. All scars, ruts or other marks in the ground caused by this work shall be repaired and the ground left in a smooth condition throughout the site.

B. The D.G. surface shall be dragged and a final dressing performed within 48 hours prior to final acceptance.

END OF SECTION

SECTION 321919 – ORNAMENTAL METAL

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all Ornamental Metal materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 30 00 CAST-IN-PLACE CONCRETE
 - 4. 08 70 00 HARDWARE
 - 5. 09 91 00 PAINTING
 - 6. 31 20 00 EARTHWORK
 - 7. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 8. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. Standards:
 - 1. In accordance with the following standards:
 - a. ASTM American Society of Testing Materials
 - b. AWS American Welding Society
 - c. NAAMM National Association Of Architectural Metal Manufacturers
 - d. NFPA National Fire Protection Association
 - e. UL Underwriters laboratories

1.3 SYSTEM DESCRIPTION

- A. Performance Requirements: It is the intention of this section and the drawings to form a guide for a complete and operable system. Any items not specifically noted but necessary for a complete and operable system shall be provided under this section.
 - 1. Lightning Protection System: Maximum grounding-resistance value of 25 ohms under normal dry conditions.
 - 2. Gate system: engineer gate system according to opening width.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 - 1. Product Data.

- a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
- 2. Shop Drawings.
 - a. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work.
 - b. Provide wiring diagrams for power, signal and control wiring.
 - c. Layout of fence and gates with dimensions, details, and finishes of component accessories and post foundations.
- 3. Samples.
 - a. Provide 3 inch square sample of each color selected.
 - b. Provide 12 inch lineal samples of each lineal piece of trim material specified.
- 4. Quality Assurance/Control Submittals:
 - a. Manufacturer's Written Instructions:
 - 1) Submit three (3) copies of manufacturer's written instructions.
- 5. Closeout Submittals in accordance with the following:
 - a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - b. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - c. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Material Qualifications:
 - a. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - 3. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
- B. Regulatory Requirements:
 - 1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

1.6 PROJECT CONDITIONS

- A. Existing Conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.7 OWNER'S INSTRUCTIONS

- A. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train the Owner's maintenance personnel as specified below:
 1. Test and adjust controls and any safeties. Replace damaged or malfunctioning controls and equipment.
 - a. Upon project completion and acceptance, the subcontractor shall issue Owner a warranty against defective workmanship and materials.

1.8 WARRANTY

- A. Contractor's General Warranty:
 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 1. In accordance with manufacturer's written standard warranty that includes language indicating the products will be free from cracking, peeling, blistering and corroding as indicated for the Warranty Period:
 - a. Warranty Period Fifteen (15) Years.
- C. Installer's Warranty:
 1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 1. Specified product manufacturer, or approved equivalent:
 - a. BUILDERS FENCE COMPANY.
 - b. Acceptable alternative manufacturers:
 - 1) AMERISTAR.
 - 2) MASTER HALCO.

2. Specified hinge product manufacturer, or approved equivalent:
 - a. McMASTER-CARR.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Steel and Iron, typical:

1. Plates, Shapes, and Bars: ASTM A 36 "Standard Specification for Carbon Structural Steel."
2. Bars (Pickets): Hot-rolled, carbon steel complying with ASTM A 29 "Specification for Steel Bars, Carbon and Alloy, Hot-Wrought, General Requirements for," Grade 1010.
3. Tubing:
 - a. Galvanized-Steel Sheet: ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process," structural quality, Grade 50, with G90 coating.
 - 1) Posts zinc coated outside and painted inside, are unacceptable.
4. Steel Sheet:
 - a. Galvanized-Steel Sheet: ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process," structural quality, Grade 50, with G90 coating.
 - b. Uncoated Steel Sheet:
 - 1) Hot-Rolled Steel Sheet, ASTM A 1011 "Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength," Structural Steel, Grade 45.
 - 2) Cold-Rolled Steel Sheet, ASTM A 1008 "Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable," Structural Steel, Grade 50.
5. Bars: Hot-rolled steel strip, ASTM A 1011 "Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength," Commercial Steel, Type B.
6. Castings: Either gray or malleable iron unless otherwise indicated.
 - a. Gray Iron: ASTM A 48 "Specification for Gray Iron Castings," Class 30.
 - b. Malleable Iron: ASTM A 47 "Specification for Ferritic Malleable Iron Castings."

2.3 COMPONENTS

A. Fence:

1. Posts (Line, End, Corner, and Gate):
 - a. Provide Square Tubing.
 - b. Metal shall be Steel Sheet, hot-dip galvanized after fabrication.
 - c. Size shall be per drawings.
 - d. Cap top of posts with flat style formed galvanized metal, weather tight closures. Weld to posts.
2. Rails (Top, Intermediate, and Bottom):
 - a. Provide Square Tubing.
 - b. Metal shall be Steel Sheet, hot-dip galvanized after fabrication.

- c. Size shall be per drawings.
- 3. Pickets:
 - a. Provide Square Tubing.
 - b. Metal shall be Steel Sheet, hot-dip galvanized after fabrication.
 - c. Size shall be per drawings.
 - d. Cap top and bottom of pickets with flat style formed galvanized metal, weather tight closures. Weld to pickets.

B. Gates:

- 1. Frames for man-gates and service gates:
 - a. Provide Square Tubing.
 - b. Metal shall be Steel Sheet, hot-dip galvanized after fabrication.
 - c. Size shall be per drawings.
 - d. Miter cut and weld gate frames.
- 2. Truss:
 - a. Provide galvanized 5/8" round diagonal tie-rod and turnbuckle at service gate frames.
 - b. Weld to gate frame
- 3. Hardware:
 - a. Hinges shall be hot-dipped galvanized with stainless steel pins. Weld hinges to gate post and gate frame. Size and locate hinges to support load of gate plus 400 lbs.
 - 1) At man gates, provide a minimum of 3 heavy-duty butt hinges per leaf.
 - 2) At service gates, provide a minimum of 4 load-rated heavy-duty butt hinges per leaf.
 - b. Closers:
 - 1) Coordinate with Specification Section – HARDWARE.
 - c. Exit Device:
 - 1) Coordinate with Specification Section – HARDWARE.
 - d. Locksets:
 - 1) Coordinate with Specification Section – HARDWARE.
 - e. Padlocks:
 - 1) Coordinate with Specification Section – HARDWARE.
 - f. Drop-Rods:
 - 1) Provide hot-dipped galvanized drop-rod assembly comprised of a minimum of two weld-on guides, two weld-on lock tabs for padlock, two drop-rod ground sleeves, and drop-rod for each service gate leaf.
 - 2) Length of drop-rod as shown on the drawings.
 - g. Lockboxes:
 - 1) Provide weldable hot-dipped galvanized steel lockboxes that coordinate with locksets and cylinders as specified in Specification Section - HARDWARE for size.
 - h. Strike Strap:
 - 1) Provide weldable hot-dipped galvanized strike strap for each leaf of each gate.

2.4 ACCESSORIES

A. Accessories:

- 1. Metal Panels:

- a. Provide galvanized, perforated metal panels of 16 gage with 3/16" round perforations, staggered at 1/4" centers creating 50% open area. Dimensions as indicated on the drawings.
2. Fasteners:
 - a. Where items are not called to be welded, fasten components with tamper-proof stainless steel fasteners sized and spaced per installers and manufacturer's written recommendations.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Concrete: Coordinate with Specification Section – CAST-IN-PLACE CONCRETE.
- C. Nonshrink Grout: Coordinate with Specification Section – CAST-IN-PLACE CONCRETE.

2.6 GROUNDING MATERIALS

- A. Grounding Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.
 1. Material above Finished Grade: Aluminum.
 2. Material on or below Finished Grade: Aluminum.
 3. Bonding Jumpers: Braided copper tape, 1 inch wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.
- B. Grounding connectors and Grounding Rods: Comply with UL 467.
 1. Connectors for Below-Grade Use: Exothermic-welded type.
 2. Grounding Rods: Copper-clad steel.
 - a. Size: 5/8 by 96 inches.

2.7 FINISHES

- A. Galvanized Finish: Clean welds, mechanical connections, and abraded areas and repair galvanizing to comply with ASTM A 780 "Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings."
 1. Provide an EM-5 Finish in color as selected by the Architect. Coordinate with Specification Section – PAINTING.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
 1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which, affect the execution of work under this specification section.

2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

- A. Coordination:
 1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
- B. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.
- C. Protection:
 1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
- D. Surface preparation:
 1. Prepare surface in accordance with manufacturer's written instructions and recommendations.

3.3 INSTALLATION

- A. General:
 1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
 2. In accordance with approved submittals.
 3. In accordance with Regulatory Requirements.
 4. Set plumb, level, and square.
- B. Layout:
 1. Lines shall be straight and true.
- C. General:
 1. Install fence in accordance with manufacturer's written instructions.
 2. Space posts uniformly at 8'-0" maximum o.c. unless otherwise indicated.
 3. Concrete Set Posts:
 - a. Drill hole in firm, undisturbed or compacted soil.
 - b. Holes shall have diameter 4 times greater than nominal outside dimension of post, and depths approximately 6" deeper than post bottom.
 - c. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads.
 - d. Set post bottom 36" (914 mm) below surface when in firm, undisturbed soil.
 - e. Place concrete around post in a continuous pour.
 - f. Vibrate or tamp for consolidation.
 - g. Protect aboveground portion of posts from concrete splatter.
 - h. Trowel finish around posts and slope to direct water away from posts.

- i. Gate Posts and Hardware: Set keepers, stops, sleeves and other accessories into concrete.

D. Weld Installation:

1. Align fence panels between posts. Attach rails to posts by welding. Miter cut rails to fit orientation of posts. Posts shall remain plumb.
2. Weld pickets to rails and gate frames. Spacing per drawings.
3. Pickets and posts shall be plumb. The top of pickets and posts shall be level.
4. Cut bottom of pickets to adjust to walk/ground contour as indicated on the drawings.
 - a. Replug bottoms when cutting to conform to ground/contours.
5. Install gates plumb, level, and secure for full opening without interference.
6. Pickets on gate frame shall be level to fence panels.
7. Install gates to meet swing directions as indicated on the drawings.
8. Attach gate hardware by means, which will prevent unauthorized removal.
9. Adjust gate hardware for smooth operation.
10. Clean welds and grind smooth. Apply galvanizing repair paint. Field paint per paragraph in Part 2 titled FINISHES within this specification section.

E. Bolt Installation:

1. Check each post for vertical and top alignment, and maintain in position during placement and finishing operation.
2. Align fence panels between posts. Firmly attach rail brackets to posts with 1/4" (6 mm) bolt and lock nut, ensuring panels and posts remain plumb.
3. Do not field-weld.

F. Gate Installation

1. Install gates plumb, level and secure for full opening without interference.
2. Attach hardware by means, which will prevent unauthorized removal.
3. Adjust hardware for smooth operation.

3.4 GROUNDING AND BONDING

A. Fence Grounding: Install at maximum intervals of 1500 feet except as follows:

1. Fences within 100 Feet of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet.
 - a. Gates and Other Fence Openings: Ground fence on each side of opening.
 - 1) Bond metal gates to gate posts.
 - 2) Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches below finished grade.

B. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a maximum distance of 150 feet on each side of crossing.

C. Fences Enclosing Electrical Power Distribution Equipment: Ground as required by IEEE C2 unless otherwise indicated.

D. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at the grounding location.

- E. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.
- F. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 - 1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
 - 2. Make connections with clean, bare metal at points of contact.
 - 3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 - 4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
 - 5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.5 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Lubricate hardware, gate operators, and other moving parts.

END OF SECTION

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SECTION 323113 – CHAIN LINK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to furnish and install Chain Link Fencing, Gates, Fittings and Accessories necessary to complete the Project as indicated by the Contract Documents.

- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 30 00 CAST-IN-PLACE CONCRETE
 - 4. 10 14 53 ROAD AND PARKING SIGNAGE
 - 5. 31 20 00 EARTHWORK
 - 6. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 7. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

- A. Standards:
 - 1. In accordance with the following standards:
 - a. CLFMI Chain Link Fence Manufacturer's Institute

1.3 SYSTEM DESCRIPTION

- A. Fencing Requirements at Preschool and Pre-Kindergarten facilities:
 - 1. General: Fence installation shall eliminate pinch points and sharp elements.
 - 2. Pool Fencing fabric, posts, rails and all exposed to view items shall have a "black" colored polyester coating.
 - 3. Fencing outside of the pool area shall be galvanized.
 - 4. Cut all bolt threads flush, maximum two threads exposed.
 - 5. Smooth all rough edges or burrs within fenced play area.
 - 6. Provide plastic caps over all fence fabric edges and wires.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
 - 1. Product Data:
 - a. Posts, Rails, and Fittings.
 - b. Chain link Fabric, Reinforcements, and Attachments.
 - c. Gates, Hardware and Fittings.

- d. Privacy Slats.
- e. Polyester Coating system used for the "Black" coated materials.
- 2. Shop Drawings:
 - a. Includes dimension plans, elevations, sections, details, and attachments to other work. Show accessories, hardware, gate operation, operational clearances and footings.
 - b. Include coordination of the work in this section with that of related work of other sections for proper interface of the completed work.
 - 1) Coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.
 - 2) Furnish to contractor as noted under Specification Section - CAST-IN-PLACE CONCRETE for installation of:
 - a) Hook Bolts.
 - b) Drop Rod Receiver.
- 3. Quality Assurance:
 - a. Certificates:
 - 1) Materials Certification.
 - 2) Installer's Certification.
- 4. Closeout Submittals in accordance with the following:
 - a. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
 - b. Project Record Documents in accordance with Specification Section - PROJECT RECORD Documents.
 - c. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer/Supplier Qualifications:
 - a. Company operating in the United States, having U.S. Manufacturing facility/facilities, experienced in successfully producing/supplying products similar to that indicated for this Project for a minimum of five (5) years and with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
 - 2. Installer Qualifications:
 - a. Company with successful experience installing similar projects and products in accordance with ASTM F 567 "Practice for Installation of Chain-Link Fence," and have at least five (5) years of experience.
- B. Regulatory Requirements:
 - 1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. CBC General Requirements:
 - 1) All gates within the Path of Travel (POT) shall meet all applicable accessible requirement specifications for doors, as defined by DSA/ACS and CBC Requirements.

- C. Certifications:
 - 1. Materials Certification: Complying with current ASTM specifications for all manufacturer's materials.
 - 2. Installer's Certification: certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
- D. Preinstallation Meeting
 - 1. Conduct meeting at Project Site.
 - 2. Review coordination of work specified in the Section and elsewhere.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 - 1. Deliver fabric, posts, rails, and other manufactured items so as not to be damaged or deformed. Package materials for protection during transportation and handling.
 - 2. Each length of chain-link fabric shall be tightly rolled and firmly tied.
 - 3. Each roll shall carry a tag showing the class of coating, the specified wire size, the mesh size, the length and height of fabric in the roll, ASTM A 392 "Specification for Zinc-Coated Steel Chain-Link Fence Fabric" and the name of mark of the manufacturer.
- B. Handling:
 - 1. Unload, and store materials in a manner to prevent bending, warping, twisting, and surface damage.
- C. Storage:
 - 1. Stack materials on platforms or pallets, covered with suitable weather tight and ventilated covering to ensure dryness. Do not store materials in contact with other materials that might cause staining, denting, or other surface damage.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify layout information for chain-link fences, and gates shown on the Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.8 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section - WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty
 - 2. Manufacturer's standard form in which manufacturer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within the specified warranty period.
 - a. Failures include, but are not limited to, deterioration of metals, metal finishes, and other materials beyond normal weathering.

- b. Installer shall have manufacturers signed Certified Installer Agreement as a rider to the warranty.
 - c. Warranty Period from date of Substantial Completions: Five (5) Years.
- C. Installer's Warranty:
- 1. In accordance with the terms of the Specification Section - WARRANTIES:
 - a. Warranty period Five (5) Years.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Fence:
- 1. Fabric:
 - a. General: Steel Wire Fabric shall comply with ASTM A 392 "Specification for Zinc-Coated Steel Chain-Link Fence Fabric" and CLFMI Product Manual and with requirements indicated.
 - 1) Steel wire helically wound and interwoven in such a as to provide a continuous mesh without knots or ties.
 - 2) Fabric to be in one-piece heights measured between top and bottom of outer edge of selvage.
 - 3) Polyester coated pool fence areas.
 - b. Wire:
 - 1) Standard: Use 9 gage (0.148 inch) copper bearing steel wire.
 - c. Mesh Size:
 - 1) Standard: 2 inch mesh.
 - d. Fabric Selvage: Knuckled at both top and bottom edges.
 - e. Protective Coating: ASTM A 392 "Specification for Zinc-Coated Steel Chain-Link Fence Fabric," Type II Zinc-Coated, Class 2 - 2.0 oz./sq.ft., galvanized by the hot-dip process after weaving.
 - 1) Quality to withstand 6 one minute immersions per ASTM A 239 "*Standard Test Method for Locating the Thinnest Spot in a Zinc (Galvanized Coating on Iron or Steel Articles by the Preece Test (Copper Sulfate Dip).*"
 - f. Strength: Wire in completed fabric after galvanization to have 7,000 pounds per square inch minimum tensile strength.
 - 2. Posts:
 - a. General: All posts shall be round, seamless or continuously welded, steel pipe complying with ASTM F 1043 "Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework," Group IA, Table 3, Heavy Industrial Fence Framework, schedule 40 pipe per ASTM F 1083 "Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures."
 - 1) Protective Coating: Complying with Type A – Zinc Coated, min. 2.0 oz./sq.ft, per ASTM A 123 "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products," for exterior coating and interior coating after fabrication.
 - a) Zinc Coated, min. 4.0 oz./sq.ft, per ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process" for rolled-form shapes.
 - b) Polyester coated pool fence areas.

- b. Line, and Terminal (end, corner, pull and gate) Posts:
 - 1) 2-3/8 inch O.D. (2.375 inch O.D.) 3.65 pounds per lineal foot.
 - 2) 2-7/8 inch O.D. (2.875 inch O.D.) 5.79 pounds per lineal foot.
 - 3) 3-1/2 inch O.D. (3.50 inch O.D.) 7.58 pounds per lineal foot.
 - 4) 4 inch O.D. (4.00 inch O.D.) 9.12 pounds per lineal foot.
 - 5) 4-1/2 inch O.D. (4.50 inch O.D.) 10.80 pounds per lineal foot.
 - 6) 5-9/16 inch O.D. (5.563 inch O.D.) 14.63 pounds per lineal foot.
 - 7) 6-5/8 inch O.D. (6.625 inch O.D.) 18.99 pounds per lineal foot.
 - 8) 8-5/8 inch O.D. (8.625 inch O.D.) 28.58 pounds per lineal foot.
- 3. Rails:
 - a. General: All rails shall be round, seamless or continuously welded, steel pipe complying with ASTM F 1043 "Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework," Group IA, Table 3, Heavy Industrial Fence Framework, schedule 40 pipe per ASTM F 1083 "Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures."
 - 1) Protective Coating: Complying with Type A – Zinc Coated, min. 2.0 oz./sq.ft, per ASTM A 123 "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products," for exterior coating and interior coating after fabrication.
 - a) Zinc Coated, min. 4.0 oz./sq.ft, per ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process" for rolled-form shapes.
 - b) Polyester coated pool fence areas.
 - b. Top, Horizontal and Bottom Rails:
 - 1) 1-5/8 inch O.D. (1.625 inch O.D.) 2.27 pounds per lineal foot.
- 4. Tension Wire:
 - a. Metallic Coated Steel Wire: Seven gage (0.177 inch diameter), marcelled tension wire complying with ASTM A 824 "Specification for Metallic-Coated Steel Marcelled Tension Wire for Use With Chain Link Fence."
 - b. Metallic Coating: ASTM A 817 "Specification for Metallic-Coated Steel Wire for Chain-Link Fence Fabric and Marcelled Tension Wire," Type II Zinc-Coated, Class 5 – 2.0 oz./sq. ft., galvanized by hot-dip process.
- 5. Hook Bolts:
 - a. 3/8 inch diameter galvanized steel.
- 6. Tie Wires and Hog Rings:
 - a. Nine gage (0.148 inch diameter) galvanized steel wire, complying with ASTM F 626 "Specification for Fence Fittings." Galvanized minimum zinc coating of 1.2 oz/sq. ft.
- 7. Tension Bars:
 - a. 1/4 inch thick x 3/4 inch galvanized bar steel, complying with ASTM F 626 "Specification for Fence Fittings." Galvanized minimum zinc coating of 1.2 oz/sq. ft. by hot-dip process after fabrication.
- 8. Tension Bands:
 - a. 7/8 inch by 3/32 inch thick minimum galvanized band steel complying with ASTM F 626 "Specification for Fence Fittings." Galvanized minimum zinc coating of 1.2 oz/sq. ft. by hot-dip process after fabrication.
- 9. Truss Rod Assembly:
 - a. 3/8 inch diameter galvanized steel truss rod and galvanized turnbuckle for adjustment in compliance with ASTM F 626 "Specification for Fence Fittings." Galvanized minimum zinc coating of 1.2 oz/sq. ft. by hot-dip process after threading.

- b. Assembly capable of withstanding a tension of 2,000 lbs.
- 10. Fittings:
 - a. General: In accordance with ASTM F 626 "Specification for Fence Fittings" and shall be hot-dip galvanized with a minimum of minimum of 1.2 oz./sq.ft., of zinc coating of surface area
 - b. Line and Terminal Post Caps: Fabricated from pressed steel or cast iron.
 - 1) Caps shall fit snugly over posts and exclude moisture from inside when tubular post are used.
 - 2) Provide Line Post Cap with loop to receive Tension Wire or Top Rail.
 - c. Rail and Brace Ends: Fabricated from pressed steel or round steel.
 - 1) Shall be provided when horizontal rail or brace are required.
 - d. Top Rail Sleeves: Fabricated from pressed steel or round steel.
 - 1) Rail sleeve material shall be a minimum of 0.051 inch in thickness and a minimum of 6 inches in length.
 - 2) Sleeve shall be fabricated to prevent movement along the rail.
 - e. Rail Clamps: Fabricated from galvanized pressed steel.
 - 1) Line and Corner Boulevard clamps for connecting intermediate and bottom rails in the fence line-to-line posts.
 - f. Polyester coated pool fence areas.

B. Gates:

- 1. General: All framing members shall be round, seamless or continuously welded, steel pipe complying with ASTM F 1043 "Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework," Group IA, Table 3 Heavy Industrial Fence Framework, schedule 40 pipe per ASTM F 1083 "Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures."
 - a. All frame corners (perimeter and interior) shall be of welded construction.
 - b. Frame members shall not be spaced no greater than 8 feet apart vertically and horizontally.
 - c. Protective Coating: Complying with Type A – Zinc Coated, min. 2.0 oz./sq.ft, per ASTM A 123 "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products," for exterior coating and interior coating, galvanized after fabrication.
 - 1) Zinc Coated, min. 4.0 oz./sq.ft, per ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process" for rolled-form shapes.
 - 2) Weld joints shall be coated with zinc-rich paint in accordance with ASTM A 780 "Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings."
 - d. Fabric: Shall be the same as specified for the Fence.
 - e. Truss Rod Assembly: Shall be the same as specified for the Fence.
- 2. Swing Gates:
 - a. General: Gate fabrication shall comply with ASTM F 900 "Specification for Industrial and Commercial Swing Gates."
 - b. Frame: Galvanized.
 - 1) 1-7/8 inch O.D. (1.875 inch O.D.) 2.72 pounds per lineal foot.
 - c. Hardware:
 - 1) Hinges: Galvanized malleable iron or heavy gage pressed steel post and frame hinges.

- 2) Single Leaf Latch: Positive locking gate latch fabricated of 5/16 inch thick by 1-3/4 inch pressed steel, galvanized after fabrication and shall have provision for a padlock.
 - 3) Double Leaf Latch: 5/8 inch diameter galvanized Drop rod arranged to engage the gate stop. Locking device shall be constructed so the center drop rod cannot be raised when the gate is locked. Latching devices shall have provision for a padlock.
 - 4) Gate Stop: Fabricated from 1 inch diameter galvanized steel pipe and 2 inch galvanized metal washer.
 - 5) Keepers: Fabricated from galvanized malleable steel Gate Holdback and 1-5/8 inch diameter galvanized pipe with post cap.
 - 6) ADA Gate Lock: Rust-proof aluminum/stainless steel lock assembly with latching mechanism, levers (both sides), key lock (lockable from both sides), keepers (latch or stop), post adapters, spacers, chain-link holders, tension bands and fittings as required.
 - a) Lock cores per Specification Section – HARDWARE.
 - 7) Exit Door Gate: Galvanized exit door assembly with 16 gage x width as required steel plate, lock box, adjustable receiver bracket, guard and fittings as required.
 - a) Surface mounted Panic Bar per Specification Section – HARDWARE.
 - 8) ADA Gate Kick-Plate:
 - 9) 1/4 inch galvanized steel plate, minimum 10" high x width as required.
3. Rolling Gates:
- a. General: Gate fabrication shall comply with ASTM F 1184 "Specification for Industrial and Commercial Slide Gates."
 - b. Polyester coated sliding pool fence.
 - c. Frame:
 - 1) 1-7/8 inch O.D. (1.875 inch O.D.) 2.72 pounds per lineal foot.
 - d. Pipe Track and Bracket:
 - 1) 1-5/8 inch O.D. (1.625 inch O.D.) 2.27 pounds per lineal foot.
 - a) Galvanized Pipe Track Bracket and fittings as required.
 - e. Roller Assembly: Galvanized rear wheels, bolts, nuts, and bracket
 - f. Wheel Assembly: Double wheel carrier, galvanized with "U-Bolts" and eight (8) inch hard rubber wheels and fittings as required.
 - g. Steel AngleTrack: 1-1/2" x 1-1/2" x 1/8" galvanized steel with welded 3/8 inch diameter "J-Bolts" at 32 inches on center.
 - h. Guide Post: Galvanized.
 - 1) 2-7/8 inch O.D. (2.875 inch O.D.) 5.79 pounds per lineal feet.
- C. Privacy Slats:
1. General:
 - a. Direction:
 - 1) Vertical.
 - b. Width: Sized to fit the direction required, and the gage and fabric used.
 - c. Length: In as long a length as practicable to keep splicing to a minimum.
 - 1) Keep waste to a minimum.
 2. Polyethylene Tubular Privacy Slats: Not less than 0.023 inch thick, manufactured for chain-link fences from virgin polyethylene containing UV inhibitor, sized to fit mesh specified for direction indicated; with vandal-resistant fasteners and lock strips.

- a. Standard Color: As selected by the Architect from the manufacturer's standard color list.
 - b. Custom Color: As directed by the Architect.
- D. Concrete:
- 1. Footings: Site Concrete as specified in Specification Section – CAST-IN-PLACE CONCRETE.
 - 2. Non-shrink, Non-metallic Grout: Premixed, factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C 1107 "Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)." Provide grout, recommended in writing by manufacturer, for exterior applications.
 - 3. Erosion-Resistant Anchoring Cement: Factor-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure with needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer, for exterior applications.
- E. Accessories:
- 1. Plastic Caps, sized to fit securely on fence wire fabric, as manufactured by STOCK CAP, or approved equivalent.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the work.
 - 1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Layout:
 - 1. Stake locations of fence lines, and terminal (end, corner, pull and gate) posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 INSTALLATION

- A. General: Construct and install chain-link fencing in compliance with ASTM F 567 "Practice for Installation of Chain-Link Fence" and more stringent requirements indicated.
- B. Posts:

1. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
 2. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
 - a. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
 - b. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
 - 1) Exposed Concrete Footing: Extend 2 inches above grade; shape and smooth to shed water.
 - 2) Concealed Concrete Footing: Stop 2 inches below bottom of material to allow covering top of footing.
 3. Terminal Posts: Locate terminal end, corner, gate posts, and locate terminal pull posts at changes in horizontal or vertical alignment of 30 degrees or more, unless noted otherwise.
 - a. End Corner, Pull and Gate Posts shall be braced and trussed for fabric 6 feet or higher, and for fabric 5 feet or higher at fencing without top rail.
 4. Line Posts: Space line posts uniformly not to exceed 10 feet on center.
- C. Rails:
1. Top Rail: Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal and gate posts, maintaining plumb position and alignment of fencing. Provide expansion couplings as recommended in writing by fencing manufacturer.
 - a. Supply in lengths approximately 20 feet long and splice rail using top rail sleeves minimum 6 inches long.
 - b. Secure rail to end, corner, pull and gate terminal posts with a brace band and rail end.
 2. Brace Rail: Install brace rails between all end, corner, gate, and pull terminal posts and the first line posts, maintaining plumb position and alignment of fencing. Securely attach to post with fittings.
 - a. Locate horizontal braces at mid-height of fabric greater than 72 inches in height, on fences with top rail and at two-third fabric height on fences without top rail.
 - 1) Spacing of brace rails not to exceed 6 feet on center vertically,
 3. Horizontal Rail: Install horizontal rails between all line posts, maintaining plumb position and alignment of fencing. Securely attach to posts with fittings.
 - a. Locate horizontal rails at mid-height of fabric 12 foot or higher,
 - 1) Spacing of horizontal rails not to exceed 12 feet on center vertically,
 4. Bottom Rails: Install and secure to posts with fittings.
- D. Truss Rod Assembly:
1. Diagonally brace all end, corner, pull and gate terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
 2. Install so posts are plumb when diagonal rod is under proper tension.
- E. Tension Wire:
1. Furnish and be responsible for accurate placement of Hook Bolts for installation in mow strip at mid-point between Line Posts.

2. Pull wire taut, without sags, independently and prior to the Fabric, between the terminal Posts and secured to the terminal Post using a brace band. Secure the tension wire to the chain link fabric with a hog rings a 18 inches on center and to each line post with a tie wire, maintain plumb position and alignment of fencing. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations
 - a. Extended along bottom of fence fabric. Install bottom tension wire within 4 inches of bottom of fabric and tie to each post with not less than same diameter and type of wire.
 - b. Hook Tension Wire thru Hook Bolts.
- F. Fabric:
1. Apply Fabric to outside of enclosing framework. Leave a maximum of 2 inches between finish grade or surface and bottom selvage, unless otherwise indicated. Pull Fabric taut and tie to Posts, Rails, and Tension Wires. Anchor to framework so fabric remains under tension after pulling force is released.
- G. Tension or Stretcher Bars: Thread through Fabric and secure to end, corner, pull, and gate Posts with Tension Bands and 5/16 inch diameter carriage bolts at 12 inches on center maximum.
- H. Tie Wire and Hog Rings: Use wire of proper length to firmly secure Fabric to line Posts, Rails, Truss Rod Assembly and Tension Wire per ASTM F 626 "Specification for Fence Fittings."
1. Fasten Fabric to Line Post with Tie Wire at 12 inches on center maximum.
 - a. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric.
 - b. Bend ends of wire to minimize hazard to individuals and clothing
 2. Fasten Fabric to Rails (top, brace, horizontal and bottom) with Tie Wire at 18 inches on center maximum.
 3. Fasten Fabric to Tension Wire with Hog Rings, spaced a maximum of 18 inches on center.
- I. Gates:
1. General: Installation of gates and gate posts in compliance with ASTM F 567 "Practice for Installation of Chain-Link Fence."
 2. Gates shall be level, plumb and secure for full operation without interference.
 - a. Attach fabric as for fencing.
 - b. Attach hardware using tamper-resistant or concealed means.
 - c. Furnish and be responsible for accurate placement of ground-set items in concrete mow strips.
 - d. Adjust hardware for smooth operation and lubricate where necessary
 3. Swing Gates:
 - a. Gates have a bottom clearance of 3 inch in the closed position, grade permitting.
 - b. Hinge and latch offset opening space from the gate frame to the post shall be no greater than 3 inches in the closed position.
 - c. Gate leaf holdbacks shall be installed for single gates 5 feet or greater in width and all double gates, unless noted otherwise.
 4. Rolling Gates: Install gate according to manufacturer's written instructions, aligned and true to fence line and grade
 - a. Gates have a bottom clearance of 3 inch in the closed position, grade permitting.

J. Fasteners:

1. All fasteners shall be installed with the smooth side on the secure side of the fence.
 - a. All bolts shall be peened over to prevent removal of the nut.

K. Privacy Slats:

1. Install in accordance with manufacturer's written requirements, in the color and direction as selected by the Architect. Keep lengths of slats as long as practical, and keep waste to a minimum.

3.4 ADJUSTMENT

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Lubricate hardware and other moving parts.

3.5 CLEAN UP

- A. The area of the fence line shall be left neat and free of any debris caused by the installation of the fence.

END OF SECTION

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SECTION 33 4100-STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipe and fittings.
 - 2. Nonpressure transition couplings.
 - 3. Cleanouts.
 - 4. Drains.
 - 5. Manholes.
 - 6. Catch basins.
 - 7. Stormwater inlets.
 - 8. Pipe outlets.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.

- D. Handle catch basins and stormwater inlets according to manufacturer's written rigging instructions.

1.6 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Construction Manager no fewer than two days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of service without Construction Manager's written permission.

PART 2 - PRODUCTS

2.1 GENERAL

- A. It shall be the Contractors option to install PVC Pipe and Fittings, or Concrete Pipe and Fittings as listed in the following sections unless specific pipe and fitting requirements are noted on the Drawings. All fittings and pipe connections shall be watertight.

2.2 PVC PIPE AND FITTINGS

A. PVC Corrugated Sewer Piping:

- 1. Pipe: ASTM F 949, PVC, corrugated pipe with bell-and-spigot ends for gasketed joints.
- 2. Fittings: ASTM F 949, PVC molded or fabricated, socket type.
- 3. Gaskets: ASTM F 477, elastomeric seals.

B. PVC Type PSM Sewer Piping:

- 1. Pipe: ASTM D 3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
- 2. Fittings: ASTM D 3034, PVC with bell ends.
- 3. Gaskets: ASTM F 477, elastomeric seals.

C. PVC Gravity Sewer Piping:

- 1. Pipe and Fittings: ASTM F 679, Min 46 psi Pipe Stiffness, PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM F 477, elastomeric seals for gasketed joints.

D. PVC Pressure Piping:

1. Gaskets: ASTM F 477, elastomeric seals.

2.3 CONCRETE PIPE AND FITTINGS

A. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76.

1. Bell-and-spigot ends and gasketed joints with ASTM C 443, rubber gaskets

B. Appropriate pipe class shall be determined by the depth of cover listed below unless indicated otherwise on the Drawings:

1. Class III, Wall B min. for cover depths from 2 feet to 3 feet
2. Class II, Wall B min. for cover depths greater than 3 feet up to 9 feet.
3. Class III, Wall B min. for cover depths of greater than 9 feet up to 14 feet.
4. Class IV, Wall B min. for cover depths of greater than 14 feet up to 21 feet
5. Class V, Wall B min. for cover depths greater than 21 feet up to 30 feet.

2.4 NONPRESSURE TRANSITION COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Unshielded, Flexible Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dallas Specialty & Mfg. Co.
 - b. Fernco, Inc.
 - c. Logan Clay Pipe.
 - d. Mission Rubber Company; a division of MCP Industries, Inc
 - e. NDS.
 - f. Plastic Oddities; a division of Diverse Corporate Technologies, Inc
2. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

C. Shielded, Flexible Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cascade Waterworks Mfg.
 - b. Dallas Specialty & Mfg. Co.
 - c. Mission Rubber Company; a division of MCP Industries, Inc
2. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Ring-Type, Flexible Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fernco, Inc.
 - b. Logan Clay Pipe.
 - c. Mission Rubber Company; a division of MCP Industries, Inc
2. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.5 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.

2.6 MANHOLES

A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with rubber gasket joints.
2. Diameter: 48 inches minimum unless otherwise indicated.
3. Base: Cast-in-place concrete as indicated on drawings.
4. Top Section: Concentric-cone with top of cone of size that matches grade rings.
5. Joint Sealant: ASTM C 990, bitumen or butyl rubber. Joints shall be water-tight.

6. Reinforced-concrete rings, 9 to 18-inch total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.

B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch ID by 4 to 6-inch riser, with 4-inch minimum-width flange and 25-1/4 to 26-inch diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
2. Material: ASTM A 48/A 48M, Class 35 gray iron unless otherwise indicated.

2.7 CONCRETE

A. General: Cast-in-place concrete complying with ACI 318, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel (1.5" max.).
4. Water: Potable

B. Portland Cement Design Mix for Cast in Place Concrete: Class 3 Concrete, 2500 psi minimum at 28 days, with 0.50 maximum water/cementitious materials ratio unless noted otherwise on the Drawings.

1. Reinforcing Bars: ASTM A 615, Grade 60 deformed steel

2.8 CATCH BASINS

A. Standard Precast Concrete or Cast in Place Catch Basins as indicated on the Drawings.

B. Designed Precast Concrete Catch Basins: ASTM C 913, precast, reinforced concrete; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for joint sealants.

1. Joint Sealants: ASTM C 990, bitumen or butyl rubber.
2. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

C. Frames and Grates: ASTM A 536, Grade 80-55-06, ductile iron or ASTM A 48, Class 35 gray iron designed for H-20 structural loading. Include flat grate with slotted drain openings.

1. Size: As indicated on drawings.
2. Grate Free Area: Approximately 40 percent unless otherwise indicated.

2.9 STORMWATER INLETS

- A. Combination Inlets: Made with vertical curb and horizontal gutter openings as indicated on the Drawings
- B. Frames and Grates: Heavy duty.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Section 31 2000 "Earth Moving."

3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Due to the scale of the drawings, it is not possible to indicate all offsets, fittings, etc., which may be required. It shall be the responsibility of the contractor to review the Drawings and furnish all fittings, etc. necessary to complete the work.
- D. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- E. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- F. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- G. Install gravity-flow, nonpressure drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow.
 - 2. Install piping with 36-inch minimum cover, unless otherwise indicated.

3. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
 4. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
- H. Install corrosion-protection piping encasement over the following underground metal piping according to ASTM A 674 or AWWA C105:
1. Hub-and-spigot, cast-iron soil pipe and fittings.
 2. Hubless cast-iron soil pipe and fittings.
 3. Ductile-iron pipe and fittings.
 4. Expansion joints and deflection fittings.

3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure drainage piping according to the following:
1. Join PVC corrugated sewer piping according to ASTM D 2321 for elastomeric-seal joints.
 2. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasketed joints.
 3. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
 4. Join dissimilar pipe materials with nonpressure-type flexible couplings.
- B. Join force-main pressure piping according to the following:
1. Join PVC pressure piping according to AWWA M23 for gasketed joints.

3.4 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from storm sewer pipes to cleanouts at grade. Pipe branches for cleanouts and riser extensions shall be PVC as indicated on the Drawings. Install piping so cleanouts open in direction of flow in storm sewer pipe.
- B. Set cleanout frames and covers with concrete collar as indicated on the Drawings in landscape areas.
- C. Set cleanout frames and covers with concrete collar as indicated on the Drawings in concrete pavement and roads with tops flush with pavement surface.

3.5 DRAIN INSTALLATION

- A. Install type of drains in locations indicated.

1. Use Light-Duty, top-loading classification drains in earth or unpaved foot-traffic areas.
 2. Use Heavy-Duty, top-loading classification drains in and roads areas.
- B. Fasten grates to drains if indicated.
- C. Set drain frames and covers with tops flush with pavement surface.

3.6 MANHOLE INSTALLATION

- A. General: Install manholes, complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Where specific manhole construction is not indicated, follow manhole manufacturer's written instructions.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.

3.7 CATCH BASIN INSTALLATION

- A. Construct catch basins to sizes and shapes indicated.
- B. Set frames and grates to elevations indicated.

3.8 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.9 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Section 22 1413 "Facility Storm Drainage Piping."
- B. Connect force-main piping to building's storm drainage force mains specified in Section 22 1413 "Facility Storm Drainage Piping." Terminate piping where indicated.
- C. Make connections to existing underground manholes.

1. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
 - a. Use concrete that will attain a minimum 28-day compressive strength of 2500 psi unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials
2. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.10 IDENTIFICATION

- A. Materials and their installation are specified in Section 31 2000 "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
 1. Use detectable warning tape over ferrous piping.
 2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.11 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 1. Submit separate reports for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - 1) Mandril Tests: Upon completion of backfill and compacting trenches, the contractor, at his own expense shall pull a properly sized mandril through the installed main lines, 8 inches inside diameter and larger, to demonstrate that the maximum pipe deflection does not exceed 5%. If excessive pipe

deflection obstructs passage of the mandril, the contractor shall excavate and make suitable repairs.

- c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
3. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
1. Do not enclose, cover, or put into service before inspection and approval.
 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 4. Submit separate report for each test.
 5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, and the following:
 - a. Air test plastic piping according to UNI-B-6 or ASTM F 1417.
 - b. Test concrete piping for exfiltration according to ASTM C969.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.12 CLEANING

- A. Clean interior of piping of dirt and superfluous materials. Flush with water.

END OF SECTION 33 4100

APPENDIX B

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Project: Mission Oak HS Aquatic Complex
Client: Tulare Joint Union High School District
Location: Tulare, CA

Darden Project #2180

APPENDIX "B": INTERIOR COLOR SCHEDULE

<u>MATERIAL</u>	<u>MANUFACTURER</u>	<u>REF #</u>	<u>DESCRIPTION</u>	<u>NOTE</u>
<i>CAST-IN-PLACE CONCRETE</i>				
Concrete Slab (Concrete curb, Sim.)			Clear Floor Sealer	
Bench			To be PAINT, Specialty Paint, X-21	
<i>POLISHED CONCRETE FINISHING</i>				
Polished Concrete			Natural	
<i>CONCRETE MASONRY UNITS</i>				
Blocks	Basalite	S-701(B)	Lightweight - Standard Color	
Note: Interior to be Precision face				
<i>MODULAR CASEWORK</i>				
Phenolic-Composite				
Tall Cabinet	} Wilsonart	8210K-28	Portico Teak (AEON Scratch Resistance Finish)	
Door				
Drawer				
Face Panel				
End Panel				
Back Panel				
Shelves				
Edge Banding				
Countertop	Wilsonart	-	Linen	
<i>SHEET METAL</i>				
Countertop	-	-	Stainless Steel	
<i>RESILIENT BASE AND ACCESSORIES</i>				
Rubber Base				
Color 1	Mannington	190	Jackalope	
Unless Otherwise Noted				
<i>WALL COVERINGS</i>				
Fiberglass Reinforced Panels	Crane Composites	LNMC - 8044	Pepper Dust (Linen Texture)	
Note: Provide Nudo - Aluminum Trims. Refer to specification for infor				
Solid Surface	Corian	-	Linen	
Vinyl Covered Tackboard	Koroseal	H921-26	Highlander - Sett	

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Darden Project #2180

APPENDIX "B": INTERIOR COLOR SCHEDULE

<u>MATERIAL</u>	<u>MANUFACTURER</u>	<u>REF #</u>	<u>DESCRIPTION</u>	<u>NOTE</u>
<i>ACOUSTICAL CEILING</i>				
Suspension System <i>Grid and Trims to be White</i>	Armstrong	-	White	ADD 01
<i>FIBERGLASS DOORS AND FRAMES</i>				
Doors and Frames	Tiger Door	-	Paper White	
Window Frames	Tiger Door	-	Paper White	
Louvers	Tiger Door	-	Paper White	
<i>PAINT</i>				
Gypsum Board / Cement Plaster				
P-1	PPG	1007-1	Willow Springs	
<i>Unless otherwise noted.</i>				
P-2	Dunn Edwards	DEA188	Black Bay	
P-3	PPG	1176-7	Perfectly Purple	AD8
<i>Note: P-3 to occur in P201 Team Room only.</i>				
Metal Deck	Dunn Edwards	DEA188	Black Bay	
Interior Concrete CB-1			Clear Water Repellent Sealer	
Specialty Paint				
X-20	Ramuc	355	Beach Beige	
X-21	Sherwin Williams	-	Modern Camo	
<i>TOILET PARTITIONS</i>				
Solid Plastic Partition	Scranton	-	Grey	
<i>VISUAL DISPLAY BOARDS</i>				
Liquid Marker Board Type 2			Color to be selected on submittal from manufacturer's standard range of color	

Project: Mission Oak HS Aquatic Complex
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Darden Project #2180

APPENDIX "B": INTERIOR COLOR SCHEDULE

<u>MATERIAL</u>	<u>MANUFACTURER</u>	<u>REF #</u>	<u>DESCRIPTION</u>	<u>NOTE</u>
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GENERAL NOTES

1. The intent of this schedule is to clarify and detail the color and patterns of finishes. All information regarding construction conditions, casework, framing and ceiling details, etc. shall be per Architectural plans, unless otherwise noted.
2. Interior Color Schedule to be used in conjunction with Architectural plans and Specifications.
3. Paint colors listed on Interior Color Schedule are for color reference only. Refer to Architectural Specifications and Finish Schedules for information regarding paint systems.
4. All Gypsum Board and Cement Plaster surfaces to be painted Color 1, unless otherwise noted.
5. All access doors and frames to be painted to match color of adjacent surface.
6. All miscellaneous exposed to view metal, plumbing and mechanical equipment, and exposed steel beams receiving a field finish to be painted to match color of adjacent surface.
7. Samples and mock-up of each polished concrete colors must be provided to, and approved by Darden Architects prior to commencement of work.
8. All finishes to extend inside accessible base cabinets.
9. All modular casework edgebanding to match adjacent material, finish, and color.
10. All paints are to be submitted in the form of brushouts and to Darden Architects for approval and on-site approval of accent paint locations prior to commencement of work.
11. All exposed mechanical grilles/registers to match adjacent surface, unless otherwise noted.

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APPENDIX C

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Project: Mission Oak HS Aquatic Complex
Client: Tulare Joint Union High School District
Location: Tulare, CA

Darden Project #2180

APPENDIX "C": EXTERIOR COLOR SCHEDULE

<u>MATERIAL</u>	<u>MANUFACTURER</u>	<u>REF #</u>	<u>DESCRIPTION</u>	<u>NOTE</u>
CONCRETE MASONRY				
Blocks, BC-1	Basalite	S-701(B)	Lightweight - Standard	
Note: Exterior to be Ground face			Color	
METAL SHINGLES				
Barrel-Vault Tile	Westlake	4DDP93185SF	Barclay	
CEMENT PLASTER				
Plaster System				
PC-1			Match to ICI #739 - Antique White	
<i>Refer to Architectural Elevations for locations of colors.</i>				
FIBERGLASS DOORS AND FRAMES				
Doors and Frames	Tiger Door	-	Paper White	
Window Frames	Tiger Door	-	Paper White	
Louvers	Tiger Door	-	Paper White	
TILE				
Ceramic Wall Tile, CT-4				ADD 01
Color 1	DalTile	QH24	Ivory	
Color 2	DalTile	QH32	Cloud	
Color 3	DalTile	QH45	Black	
Color 4	DalTile	QH54	Grape	
<i>Grout: Custom Building Product #381 - Bright White</i>				
PAINT				
Steel and Fabrications				
Exposed Structural Steel:				
MC-1			Match to ICI #739 - Antique White	
Sheet Metal				
Gutters/Downspouts:				
MC-1			Match to ICI #739 - Antique White	
Concrete Masonry Units				
			Match to PPG 1176-7 - Perfectly Purple	
<i>Note: To occur on exposed CMU wall behind building grille. Refer to Exterior Details, STEEL AND FABRICATIONS, Building Grille Detail.</i>				

Project: Mission Oak HS Aquatic Complex
Client: Tulare Joint Union High School District
Location: Tulare, CA

Darden Project #2180

APPENDIX "C": EXTERIOR COLOR SCHEDULE

<u>MATERIAL</u>	<u>MANUFACTURER</u>	<u>REF #</u>	<u>DESCRIPTION</u>	<u>NOTE</u>
<i>STEEL AND FABRICATIONS</i>				
Building Grille Detail	-	-		Black
Canopy			Match to PPG 1176-7 - Perfectly Purple	AD8
<i>MISCELLANEOUS SPECIALTIES</i>				
Glassfiber Reinforced Column Covers / Fascia			Match to adjacent surface	
ALT. BID 1 - BUILDING P1				
<i>CEMENT PLASTER</i>				
Cement Plaster				
PC-1			Match to ICI #739 - Antique White	
<i>Refer to Architectural Elevations for locations of colors.</i>				
PC-2	PPG	1176-7	Perfectly Purple	
<i>CONCRETE MASONRY</i>				
Blocks	Basalite	S-93(R)	Standard Color	
Note: Exterior to be Ground face				
<i>ORNAMENTAL METAL</i>				
Site Gates and Fence			Match to existing	
<i>SHEET METAL</i>				
Architectural, Gutters				
MC-1			Match to ICI #739 - Antique White	
<i>MISCELLANEOUS SPECIALTIES</i>				
Dimensional Letters				
Type 1	Gemini	-	Anodized Aluminum	
Note: "AQUATICS COMPLEX". Refer to Sheet P/A401				

Project: Mission Oak HS Aquatic Complex
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Darden Project #2180

APPENDIX "C": EXTERIOR COLOR SCHEDULE

<u>MATERIAL</u>	<u>MANUFACTURER</u>	<u>REF #</u>	<u>DESCRIPTION</u>	<u>NOTE</u>
ALT. BID 3 - BUILDING P1				
<i>MISCELLANEOUS SPECIALTIES</i>				
Dimensional Letters				
Type 2	Gemini	-	Anodized Aluminum	
Note: "MISSION OAK HAWKS" and "SUPER HAWKS". Refer to Sheet SD/A102.3				
Type 3	Gemini	-	Anodized Aluminum	
Note: "DONOR WALL" and "WALL OF FAME". Refer to Sheet SD/A102.3				
Display Wall, Lexan Panel				
Type 1	Sabic		9034	Clear
Type 2	Sabic		9034	Clear
Type 3	Sabic		9034	Clear

GENERAL NOTES:

1. Paint colors listed on Exterior Color Schedule are for color reference only. Refer to Architectural Specifications and Finish Schedules for type.
2. Change of color is to occur at control joints or an inside corner, unless otherwise noted.
3. Cement plaster accessories shall match primary color of adjacent material, unless otherwise noted. Cement plaster vents to remain unfinished.
4. Mechanical grille/louvers with factory baked enamel finish shall match primary color of adjacent hollow metal door frame. Louvers located in doors shall match door color.
5. All miscellaneous visual architectural sheet metal and steel fabrications including, but not limited to, mechanical/ plumbing/ electrical equipment shall match color of adjacent material, unless otherwise noted.
6. Soffits shall match color of outer face wall, unless otherwise noted.
7. Parapet caps shall match color of adjacent cement plaster.