Project Manual

MOT Building

for:

Fairfax School District

Project #	
2023- 2314	

Set #



Fairfax School District 1500 S Fairfax Road Bakersfield, CA 93307

REQUEST FOR PROPOSAL For: MOT Building Fairfax School District RFP #2023-2314

DEADLINE TO SUBMIT BID

Bidding Schedule:	Issue date of the solicitation:	06/04/2025
	Deadline for Bid RFI's due:	06/30/2025 @ 2:00pm
	Clarifications Issued by:	07/04/2025
	Proposals Due:	07/10/2025 @ 2:00pm

(RFI) must be submitted by email to:

Manuel Maldonado <u>jmaldonado@ordizmelby.com</u> Alyssa Grishaber <u>agrishaber@ordizmelby.com</u> Charlene Perry <u>cperry@ordizmelby.com</u>

Use Bid Package item 30-BID QUESTION FORM for Questions or RFI's

ANTICIPATED START DATE:

07/24/2025

Submit bids in a Sealed Envelope to:

Fairfax School District 1500 S. Fairfax Road Bakersfield, CA 93307 Attn: David Mack

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01-NOTICE TO CONTRACTORS CALLING FOR BIDS

- 1. OWNER: Fairfax School District
- 2. PROJECT IDENTIFICATION NAME: MOT Building / #2023-2314
- 3. PROJECT LOCATION: 6327 Zephyr Lane, Bakersfield, CA 93307

4. PROJECT DESCRIPTION: *[attach extra page(s) if necessary]* Construction of a preengineered metal building foundation along with interior improvements for a new MOT facility and all associated site work for the MOT and new District Office building.

This project is anticipated to start on approximately 07/24/2025 and is anticipated to have a duration of 200 calendar days for completion.

5. BID DEADLINE: Bids are due on 07/10/2025 at 2pm or at any other date or time as set by Addendum.

- 6. PLACE OF BID RECEIPT: Fairfax School District: 1500 S. Fairfax Road; Bakersfield, CA 93307
- 7. METHOD OF BID RECEIPT: Personal delivery, courier, or mailed via United States Postal Service to above address.

8. PLACE PLANS ARE ON FILE: Kern Counter Builder's Exchange website, Ordiz-Melby Architects, Inc. office, and Fairfax School District website.

9. SEALED BID MARKING: bidders name, project designation (RFP No. 2314.00 District Office Modular Building for Fairfax School District), and the date and time of the opening of bids in the upper left-hand corner and addressed to the Fairfax School District in the center of the envelope.

10. ALTERNATES: If alternate bids are called for, the contract will be awarded to the lowest responsive and responsible bidder on the basis indicated below:

- □ (a) The lowest bid shall be the lowest bid price on the base contract without consideration of the prices on the additive or deductive items.
- □ (b) The lowest bid shall be the lowest total of the combined bid prices on the base contract and alternates [specify].
- □ (c) The lowest bid shall be the lowest total of the bid prices on the base contract and alternates , taken in order, up to a maximum amount to be publicly disclosed before the first bid is opened.
- (d) The lowest bid shall be determined in a manner that prevents any information that would identify any of the bidders or proposed subcontractors or suppliers from being revealed to the public entity before the ranking of all bidders from

lowest to highest has been determined.

- \square (e) Not applicable to this project, as no alternates are requested.
- 11. MANDATORY JOB WALK: N/A

If a job walk is required on this project, attendance at the entire job walk is mandatory and failure to attend the entire job walk may result in your bid being rejected as non-responsive. Contact OWNER for details on required job walks and related documentation.

12. PLAN DEPOSIT REQUIRED: \$0.00

13. This is a prevailing wage project. OWNER has ascertained the general prevailing rate of per diem wages in the locality in which this work is to be performed for each craft or type of worker needed to execute this contract. These rates are on file at OWNER's office, and a copy may be obtained upon request, or at <u>www.dir.ca.gov</u>. Contractor shall post a copy of these rates at the job site. ALL PROJECTS OVER \$1,000 ARE SUBJECT TO PREVAILING WAGE MONITORING AND ENFORCEMENT BY THE LABOR COMMISSIONER.

It shall be mandatory upon the contractor to whom the contract is awarded (CONTRACTOR), and upon any SUBCONTRACTOR, to pay not less than the specified rates to all workers employed by them in the execution of the contract.

14. A Payment Bond for contracts over \$25,000 and a Performance Bond for all contracts will be required prior to commencement of work. These bonds shall be in the amounts and form called for in the Contract Documents.

15. Pursuant to the provisions of Public Contract Code Section 22300, CONTRACTOR may substitute certain securities for any funds withheld by OWNER to ensure CONTRACTOR's performance under the contract. At the request and expense of CONTRACTOR, securities equivalent to any amount withheld shall be deposited, at the discretion of OWNER, with either OWNER or a state or federally chartered bank as the escrow agent, who shall then pay any funds otherwise subject to retention to CONTRACTOR. Upon satisfactory completion of the contract, the securities shall be returned to CONTRACTOR.

Securities eligible for investment shall include those listed in Government Code Section 16430, bank and savings and loan certificates of deposit, interest bearing demand deposit accounts, standby letters of credit, or any other security mutually agreed to by CONTRACTOR and OWNER. CONTRACTOR shall be the beneficial owner of any securities substituted for funds withheld and shall receive any interest on them. The escrow agreement shall be in the form indicated in the Contract Documents.

16. To bid on or perform the work stated in this Notice, CONTRACTOR must possess a valid and active contractor's license of the following classification(s) Class B. No CONTRACTOR or subcontractor shall be qualified to bid on, be listed in a bid

proposal, subject to the requirements of § 4104 of the Public Contract Code, for a public works project (submitted on or after March 1, 2015) unless currently registered with the Department of Industrial Relations (DIR) and qualified to perform public work pursuant to Labor Code § 1725.5. No CONTRACTOR or subcontractor may be awarded a contract for public work on a public works project (awarded after April 1, 2015) unless registered with the DIR. DIR's web registration portal is:

17. CONTRACTOR and all subcontractors must furnish electronic certified payroll records (eCPR) to the Labor Commissioner [specify weekly, bi-weekly or monthly] in PDF format. Registration at <u>www.dir.ca.gov/Public-Works/Certified-Payroll-Reporting.html</u> is required to use the eCPR system.

The following notice is given as required by Labor Code Section 1771.5(b)(1): CONTRACTOR and any subcontractors are required to review and comply with the provisions of the California Labor Code, Part 7, Chapter 1, beginning with Section 1720, as more fully discussed in the Contract Documents. These sections contain specific requirements concerning, for example, determination and payment of prevailing wages, retention, inspection, and auditing payroll records, use of apprentices, payment of overtime compensation, securing workers' compensation insurance, and various criminal penalties or fines which may be imposed for violations of the requirements of the chapter. Submission of a bid constitutes CONTRACTOR's representation that CONTRACTOR has thoroughly reviewed these requirements.

- 18. [check only one]
- \Box (a) OWNER will retain 5% of the amount of any progress payments.
- ☑ (b) OWNER will retain 10% of the amount of any progress payments because the project has been found to be substantially complex.

19. This Project \Box requires \boxtimes does not require prequalification pursuant to AB 1565 and/or AB 1433 (Public Contract Code section 20111.6, as amended) of all general contractors and all mechanical, electrical and plumbing subcontractors. If required, a Prequalification package may be obtained by downloading the necessary forms from. A bid package will not be accepted from any bidder that is required to submit a completed questionnaire and supporting documents pursuant to AB 1565 and/or AB 1433 but has not done so at least ten (10) business days prior to the date fixed for the public opening of sealed bids or that has not been prequalified for at least five (5) business days prior to that date.

02-INSTRUCTIONS TO BIDDERS

WARNING: READ THIS DOCUMENT CAREFULLY DO NOT ASSUME THAT IT IS THE SAME AS OTHER SIMILAR DOCUMENTS YOU MAY HAVE SEEN EVEN IF FROM THE SAME OWNER

PROJECT TITLE/BID #: MOT Building / #2023-2314 OWNER: Fairfax School District

1. <u>Preparation of Bid Form</u>.

The Owner invites bids on the form attached to be submitted at the time and place stated in the Notice to Contractors Calling for Bids. Bids shall be submitted on the prescribed Bid Form, completed in full. All bid items and statements shall be properly and legibly filled out. Numbers shall be stated both in words and in figures where so indicated, and where there is a conflict in the words and the figures, the words shall govern. The signatures of all persons shall be in longhand. Prices, wording, and notations must be in ink or typewritten.

2. <u>Form and Delivery of Bids</u>.

The bid must conform to and be responsive to all Contract Documents and shall be made on the Bid Form provided. The complete bid, together with any additional materials required, shall be enclosed in a sealed envelope, addressed and hand-delivered or mailed to the Owner at the address set forth in the Notice to Contractors Calling for Bids, and must be received on or before the time set for the opening of bids. The envelope shall be plainly marked in the upper left-hand corner with the bidder's name, the project designation, and the date and time for the opening of bids. It is the bidder's sole responsibility to ensure that its bid is received prior to the bid deadline. In accordance with Government Code Section 53068, any bid received after the scheduled closing time for receipt of bids shall be returned to the bidder unopened.

At the time set for the opening of bids, the sealed bids will be opened and publicly read aloud at the place indicated in the Notice to Contractors Calling for Bids. However, if this project calls for prequalification of bidders pursuant to Public Contract Code Section 20111.5, only those sealed bids received from bidders who have been prequalified for at least one day prior to bid opening shall be opened and publicly read aloud.

3. <u>Bid Security</u>.

Each bid shall be accompanied by a bid security in cash, a certified or cashier's check, or bid bond in an amount not less than 10 percent of the total bid price payable to the Owner. The bid security shall be given as a guarantee that if awarded the contract the bidder will execute and return the Construction Agreement within 10 working days after award of the

contract and will furnish on the prescribed forms a satisfactory Payment (labor and material) Bond and separate Performance Bond, in accordance with the Contract Documents and Civil Code Sections 9550 et seq., and certificates evidencing that the required insurance is in effect in the amounts set forth in the Contract Documents. In case of refusal or failure to timely execute the Construction Agreement and furnish the required bonds and insurance certificates, the bid security shall be forfeited to the Owner. If the bidder elects to furnish a bid bond as its bid security, the bidder shall use the bid bond form included in the Contract Documents, unless the Owner elects to waive the use of the form provided, in its sole discretion.

4. <u>Signature</u>.

At the various times such documents are required to be submitted, the Bid Form, all bonds, the Designation of Subcontractors form, all Information Required of Bidder or pregualification forms, Workers Compensation Certificate, Drug-Free Workplace Certification, Non-Collusion Affidavit, Asbestos and Lead Based Paint Certification, Iran Contracting Act Certification, the Construction Agreement, and all Guarantees must be signed in the name of the bidder and must bear the signature of the person or persons duly authorized to sign these documents. Where indicated, if bidder is a corporation, the legal name of the corporation shall first be set forth, together with two signatures: one from among the chairman of the board, president, or vice president, and one from among the secretary, chief financial officer, or assistant treasurer. Alternatively, the signature of other authorized officers or agents may be affixed, if duly authorized by the corporation. Such documents shall include the title of such signatories below the signature and shall bear the corporate seal. Where indicated, if bidder is a joint venture or partnership, the bidder shall submit with the bid certifications signed by authorized officers of each of the parties to the joint venture or partnership, naming the individual (1) who shall be the agent of the joint venture or partnership, (2) who shall sign all necessary documents for the joint venture or partnership and, (3) should the joint venture or partnership be the successful bidder, who shall act in all matters relative to the resulting contract for the joint venture or partnership. If bidder is an individual, his/her signature shall be placed on such documents.

5. <u>Modifications</u>.

Changes in or additions to any of the bid documents, the summary of the work bid upon, or the alternative proposals, or any other modifications which are not specifically called for by the Owner, may result in the Owner's rejection of the bid as not being responsive. No oral or telephonic modification of any bid will be considered. However, prior to the opening of bids, a telegraphic modification signed by the bidder and postmarked and received prior to the opening of bids, or a facsimile modification duly signed by the bidder received prior to the opening of bids, may be considered if included within a sealed bid.

6. <u>Erasures, Inconsistent, or Illegible Bids</u>.

The bid submitted must not contain any erasures, interlineations, or other corrections

unless each correction creates no inconsistency and is suitably authenticated and noted by signature of the bidder. In the event of inconsistency between words and figures in the bid, words shall control figures. In the event the Owner determines that any bid is unintelligible, illegible, or ambiguous, the Owner may reject the bid as not being responsive.

7. <u>Examination of Site and Contract Documents</u>.

At its own expense and prior to submitting bids, each bidder shall examine all documents relating to the project, visit the site, and determine the local conditions which may in any way affect the performance of the work, including the general prevailing rate of per diem wages and other relevant cost factors. Each bidder shall be familiar with all federal, state, and local laws, ordinances, rules, regulations, and codes affecting the performance of the work, including the cost of permits and licenses required for the work. Each bidder shall make such surveys and investigations, including investigation of subsurface or latent physical conditions at the site or where work is to be performed, as it may deem necessary for performance of the work at the price being bid. Each bidder shall determine the character, quality, and quantities of the work to be performed and the materials and equipment to be provided, and shall correlate its observations, investigations, and determinations with all requirements of the project.

The Contract Documents show and describe the existing conditions as they are believed to have been used in the design of the work and are only provided as information for the bidder. The Owner is not making any warranties regarding this information. The Owner shall not be liable for any loss sustained by the successful bidder resulting from any variance between the conditions and design data given in the Contract Documents and the actual conditions revealed during the bidder's pre-bid examination or during the progress of the work. Bidder agrees that the submission of a bid shall be incontrovertible evidence that the bidder has complied with and agrees to further comply with all the requirements of this section.

8. <u>Withdrawal of Bids</u>.

Any bid may be withdrawn, either personally, by written request, or by telegraphic or facsimile request confirmed in the manner specified above for bid modifications, at any time prior to the scheduled closing time for receipt of bids. In accordance with this paragraph, the bid security shall be returned for bids withdrawn prior to the scheduled closing time for receipt of bids. No bidder may withdraw any bid for a period of 60 days after the award of the contract. A bidder's unawarded alternative bids remain open for a period of six months after award of contract as irrevocable offers to enter into either change orders or separate contracts for the stated price adjustment.

9. <u>Agreement and Bonds</u>.

The Construction Agreement and the form of the Payment and Performance Bonds which the successful bidder as Contractor will be required to execute are included in the Contract Documents and should be carefully examined by the bidder. The Payment Bond shall be in an amount not less than 100 percent of the amount of the contract in accordance with Civil Code section 9554. The successful bidder as Contractor will also be required to furnish a separate Performance Bond in the amount of 100 percent of the contract amount. Sufficient bonds shall be fully executed and returned to Owner with the executed Construction Agreement.

10. <u>Interpretation of Contract Documents</u>.

If any bidder is in doubt as to the true meaning of any part of the Contract Documents, or finds discrepancies in or omissions from the drawings and specifications, a written request for an interpretation ("RFI") or correction shall be submitted to the Owner. The bidder submitting the RFI shall be responsible for its prompt delivery. Any interpretation or correction of the Contract Documents will be made only by addendum issued by the Owner, and a copy of any addendum will be hand-delivered, mailed, or faxed to each bidder known to have received a set of the Contract Documents. No person is authorized to make any oral interpretation of any provision in the Contract Documents, nor shall any oral interpretation be binding on the Owner. If there are discrepancies on drawings, plans, or specifications, or conflicts between drawings, plans, specifications, terms, or conditions, the interpretation of the Owner shall prevail. Bidder shall become familiar with the plans, specifications, and drawings, but shall inspect each document independently to determine the full scope of the bid package and submit written questions to Owner, utilizing the RFI process described above, in the event of any identified potential discrepancies.

SUBMISSION OF A BID WITHOUT REQUESTING CLARIFICATIONS SHALL BE INCONTROVERTIBLE EVIDENCE THAT THE BIDDER HAS DETERMINED THAT THE PLANS, SPECIFICATIONS, AND DRAWINGS ARE SUFFICIENT FOR BIDDING AND COMPLETING THE WORK, THAT BIDDER IS CAPABLE OF READING, FOLLOWING AND COMPLETING THE WORK IN ACCORDANCE WITH THE PLANS. SPECIFICATIONS, AND DRAWINGS, AND THAT THE PLANS, SPECIFICATIONS, AND DRAWINGS FALL WITHIN AN ACCEPTABLE STANDARD FOR THESE ITEMS, AND THAT BIDDER AGREES THAT THE PROJECT CAN AND WILL BE COMPLETED ACCORDING TO THE OWNER'S TIME LINES AND ACCORDING TO THE PROGRESS SCHEDULE TO BE SUBMITTED BY THE SUCCESSFUL BIDDER INCORPORATING THE OWNER'S TIME LINES FOR COMPLETION OF THE PROJECT.

11. <u>Bidders Interested in More Than One Bid</u>.

No person, firm, or corporation shall be allowed to make or file or be interested in more than one bid for the same work unless alternate bids are specifically called for by the Owner. A person, firm, or corporation that has submitted a sub-proposal to a bidder, or that has quoted prices of materials to a bidder, is not disqualified from submitting a proposal or quoting prices to other bidders or submitting a bid on the project.

12. <u>Award of Contract</u>.

(a) The Owner reserves the right to reject any or all bids, or to waive any irregularities or informalities in any bids or in the bidding process, and to award more than one contract. If two identical low bids are received from responsive and responsible bidders, the Owner will determine which bid will be accepted pursuant to Public Contract Code Section 20117.

(b) If made by the Owner, award of the contract will be by action of the governing board or other governing body to the lowest responsive and responsible bidder. In the event an award of the contract is made to a bidder and that bidder fails or refuses to execute the Agreement and provide the required documents within the time required, the Owner may award the contract to the next lowest responsive and responsible bidder or release all bidders. An election by the Owner to reject all bids does not release the bid security of any bidder who has previously been awarded the contract and failed or refused to execute the Agreement and provide the required documents.

(c) In ascertaining the low bidder, the bids will be examined without reference to any substitutions requested by any bidder, whether or not the substitution request would result in a modification of the contract price.

13. <u>Alternatives</u>.

If alternate bids are called for, the contract will be awarded to the lowest responsive and responsible bidder on the basis indicated in the Notice to Contractors Calling for Bids. Owner reserves the right to award or reject any, all, or any combination of the alternates called for in the bid documents, whether or not the alternate(s) was included in the calculations used to identify the low bidder. All bid alternates not part of the contract initially awarded by Owner shall remain open and valid for a period of six months after the contract is awarded as irrevocable offers to enter into either change orders or separate contracts on the items for the price adjustment contained in the bid alternate.

14. Public Contract Code Section 20111.5—Discretionary Prequalification of Bidders.

[check one]

- Discretionary Prequalification is not required to bid on this project.
- Discretionary Prequalification is required to bid on this project. Prospective bidders are required to submit to the Owner a completed prequalification questionnaire and financial statement, on forms provided by the Owner, no later than five days prior to the date fixed for the public opening of sealed bids. These documents will be the basis for determining which bidders are qualified to bid the project. Bidders will be notified by telephone and mail of their prequalification status within four days after

submission of prequalification documents. Bids will not be accepted from any bidder who has not been prequalified at least one day prior to the bid opening. Pursuant to Public Contract Code Section 20111.5, the information in the prequalification questionnaire and financial statement will be kept confidential. Prequalification documents may be obtained by contacting the Owner or by downloading them from

15. <u>Public Contract Code Section 20111.6—Mandatory Prequalification of General</u> <u>Contractors and Mechanical, Electrical and Plumbing Subcontract Bidders</u>.

[check one]

- Mandatory Prequalification of general contractors and mechanical, electrical and plumbing subcontractors is not required to bid on this project.
- Mandatory Prequalification of general contractors and mechanical, electrical and plumbing subcontractors is required to bid on this project. Prospective bidders holding licenses in classifications A, B, C-4, C-7, C-10, C-16, C-20, C-34, C-36, C-38, C-42, C-43 and C-46 are required to submit to the Owner a completed pregualification questionnaire and financial statement, on forms provided by the Owner, no later than ten (10) working days prior to the date fixed for the public opening of sealed bids. These documents will be the basis for determining which bidders in the listed license categories are gualified to bid the project. Bidders will be notified by telephone, mail or email of their pregualification status within five (5) working days after submission of pregualification documents. Bids will not be accepted from any bidder who is required to prequalify and who has not been pregualified at least five (5) working days prior to the bid opening. Pursuant to Public Contract Code Section 20111.6, the information in the prequalification questionnaire and financial statement will be kept confidential. Prequalification documents may be obtained by contacting the Owner or by downloading them from

15. <u>Competency of Bidders</u>.

In selecting the lowest responsive and responsible bidder, consideration will be given not only to the financial standing but also to the general competency of the bidder for performance of the work. By submitting a bid, each bidder agrees that in determining the successful bidder and its eligibility for the award, the Owner may consider the bidder's experience, facilities, conduct, and performance under other contracts, financial condition, reputation in the industry, and other factors relating to or which could affect the bidder's performance of the project.

The Owner may also consider the qualifications and experience of subcontractors and other persons and organizations (including those who are to furnish the principal items of material and equipment) proposed for those portions of the work. Operating costs, maintenance considerations, performance data, and guarantees of materials and equipment may also be considered by the Owner. In this regard, the Owner may conduct

such investigations as the Owner deems necessary to assist in the evaluation of any bid and to establish the responsibility, qualifications, and financial ability of the bidder, proposed subcontractors, and other persons and organizations to do the work to the Owner's satisfaction within the prescribed time. The Owner reserves the right to reject the bid of any bidder who does not pass any such evaluation to the satisfaction of the Owner, or in the Owner's sole discretion, to permit substitution of subcontractor(s) found nonresponsible.

16. <u>Listing Subcontractors</u>.

Each bidder shall submit a list of the proposed subcontractors, including their address, California contractor's license number and DIR Registration number, on the project as required by the Subletting and Subcontracting Fair Practices Act (Public Contract Code Section 4100 and following sections) on the form furnished with the Contract Documents. If alternate bids are called for and the bidder intends to use different or additional subcontractors, a separate list of subcontractors must be submitted for each such alternate bid. The Owner may request that bidder submit information to assess the responsibility of the bidder's proposed subcontractors. The apparent low bidder shall, within 24 hours of the bid opening, provide a complete listing of all subcontractors, including full name, address, telephone numbers, contractor's license number and type and DIR Registration number.

17. <u>Workers' Compensation</u>.

In accordance with the provisions of Labor Code Section 3700, the successful bidder shall secure the payment of compensation to all employees. The successful bidder awarded the contract shall sign and file with the Owner, at the time of returning the executed Construction Agreement, the certificate which is included as a part of the Contract Documents.

18. <u>Contractor's License</u>.

At the bid opening date and time, if a bidder is not properly licensed and registered to perform the project in accordance with Division 3, Chapter 9, of the California Business and Professions Code, Labor Code section 1725.5 and the Notice Calling for Bids, as required, that bidder's bid will be rejected as non-responsive. Business and Professions Code Section 7028.15 precludes payment for work or materials unless the Registrar of Contractors verifies to the Owner that the bidder was properly licensed at the time the bid was submitted. If this project is federally funded, the bidder must be properly licensed prior to the award of the contract. Any bidder not properly licensed and registered with DIR is subject to penalties under the law and the contract can be considered void. If the license classification specified in these Contract Documents is that of a "specialty contractor" as defined in Business and Professions Code Section 7058, the specialty contractor awarded the contract for this work shall construct a majority of the work in accordance with the provisions of Business and Professions Code Section 7059.

19. Anti-Discrimination.

It is the policy of the Owner that in all work performed under contracts there be no unlawful discrimination against any prospective or active employee engaged in the work because of race, color, ancestry, national origin, religious creed, sex, age, marital status, physical disability, mental disability, or medical condition. The successful bidder agrees to comply with applicable federal and state laws, including but not limited to the California Fair Employment and Housing Act, beginning with Government Code Section 12900 and Labor Code Section 1735. In addition, the successful bidder agrees to require like compliance by any subcontractors employed on the work by that bidder.

20. Hold Harmless.

The successful bidder awarded the contract shall hold harmless and indemnify various parties as more clearly set forth elsewhere in the Contract Documents.

21. <u>Substitutions</u>.

(a) All bids should be calculated and submitted on the project as described in the bid documents, and on the assumption that substitution requests submitted with the bid will not be approved. Notwithstanding the foregoing, substitution requests submitted with bids will be given due consideration and adjustments to the contract, which may include adjustment to contract price, will be contained in a change order should the request be approved. Bidders not desiring to bid without prior approval of a proposed substitution should follow the procedure contained in this section for pre-bid review of proposed substitutions.

(b) Should the bidder wish to request prior to bid opening any substitution for the specified materials, process, service, or equipment, the bidder shall submit a written request at least ten (10) working days before the bid opening date and time. If the requested substitution is acceptable, the Owner will approve it in an addendum issued to all bidders of record. Requests received less than ten (10) working days prior to bid opening will <u>not</u> be considered prior to the bid date. Extensions of the bid date shall not operate to extend the deadline for requesting substitutions unless the Owner so states in an addendum issued to all bidders of record.

(c) If a substitution is not requested and considered prior to the bid date, the bidder shall submit with the bid all proposed substitutions, if any, on the Substitution Listing form contained in the bid documents.

(d) With respect to any materials, process, service, or equipment listed in the bid, unless the bidder clearly indicates in its Substitution Listing that it is proposing to use an "equal" material, process, service, or equipment, its bid shall be considered as offering the specified material, process, service, or equipment

referred to by the brand name or trade name specified.

(e) Unless expressly authorized in the bid documents, no bid may be conditioned on the Owner's acceptance of a proposed substitution. Any bid containing any such condition may be treated as a non-responsive bid.

(f) It is expressly understood and agreed that the Owner reserves the right to reject any proposed substitution. It is further expressly understood and agreed that in the event the Owner rejects a proposed "equal" item, or any other requested substitution, the specified material, process, service, or equipment designated by brand name or trade name, or other item as specified, will be provided.

(g) No substitution request of any kind or nature may be made after the bid date, except by the express written permission of the Owner and on such terms as Owner may require, or in an emergency, as in the case where a specified material, process, service, equipment, or other item has become unavailable through no fault of the bidder.

(h) These time limitations shall be complied with strictly, and in no case will an extension of time for completion be granted because of the failure to request the substitution of an item at the times and in the manner set forth herein.

(i) Prior to contract award, the Owner shall notify the bidder of the Owner's decision concerning proposed substitutions of "equal" items submitted with the bid. The Owner shall notify bidder of the Owner's decision on any other proposed substitutions as those decisions are made. Notification of all decisions by the Owner shall be in writing, and no proposed substitution shall be deemed approved unless the Owner has confirmed it in writing.

(j) With respect to all proposed substitutions, the requirements applicable to the Contractor in the Contract Documents shall be applicable to all bidders requesting substitutions.

22. Surety Qualifications.

Bid bonds executed by a surety insurer admitted in the State of California for purposes of issuance of such bonds will be accepted by Owner as sufficient.

Payment and/or performance bonds executed by a surety insurer admitted in the State of California with a minimum "A minus, VIII" rating (A minus V" when the price stated in the Contract Documents is less than \$500,000) as rated by the current edition of Best's Key Rating Guide published by A.M. Best Company, Oldwick, New Jersey 08858, shall be presumed by Owner to be sufficient for the issuance of such bonds. In the alternative, any admitted surety company which satisfies the requirements set forth in Code of Civil Procedure Section 995.660 shall be accepted and approved for the issuance of bonds, and

documents demonstrating satisfaction of the requirements of Section 995.660 with respect to the bid bond must be submitted with the bid. No personal sureties will be accepted.

23. Liquidated Damages.

All work must be completed within the time limits set forth in the Contract Documents. Bidders must understand that the goodwill, educational process, and other business of the Owner will be damaged if the project is not completed within the time limits required. Should the work not be completed within the specified time for completion, the successful bidder awarded the contract may be liable for liquidated damages and for expenses incurred by the Owner for failure to timely complete the project. Such damages shall be deducted from any payments due or to become due to the successful bidder.

SUBMISSION OF A BID ON THIS PROJECT SHALL BE TAKEN AS CONCLUSIVE AND IRREFUTABLE EVIDENCE THAT BIDDER AGREES WITH THE REQUIREMENTS OF THIS SECTION.

24. Drug-Free Workplace Certification.

Pursuant to Government Code section 8350 and following, the successful bidder will be required to execute and return to Owner the Drug-Free Workplace Certificate contained in the Contract Documents with the executed Construction Agreement. The bidder will be required to take positive measures outlined in the certificate to ensure the presence of a drug-free workplace. Failure to abide with the conditions set forth in the Drug-Free Workplace Act could result in penalties, including termination of the Construction Agreement.

25. Non-Collusion Declaration.

In accordance with the provisions of Public Contract Code section 7106, each bid must be accompanied by a Non-Collusion Declaration executed under penalty of perjury under the laws of the State of California.

26. Implementation of Disabled Veteran Business Enterprises Requirements.

In accordance with Education Code Section 17076.11, the Owner has a participation goal for disabled veteran business enterprises of at least three percent per year of the overall dollar amount of funds allocated to the Owner by the State Allocation Board pursuant to the Leroy F. Greene School Facilities Act of 1998 for construction or modernization and expended each year by the Owner. Prior to and as a condition precedent for final payment under any contract for this project, the successful bidder will be required to provide appropriate documentation to the Owner identifying the amount paid to disabled veteran business enterprises in conjunction with the contract, so the Owner can assess its success at meeting this goal.

27. <u>Asbestos and Lead-Based Paint Certification</u>.

The form of Contractor's Certificate Regarding Non-Asbestos Containing Materials and Exclusion of Lead Products, as contained in the Contract Documents, shall be executed and submitted with the bid.

28. <u>Fingerprinting Requirements</u>.

The successful bidder and all subcontractors at any level will be required to comply with any applicable laws on fingerprinting construction workers. Minimum requirements are set forth in the Contract Documents, and the form for certification of compliance is contained in the Contract Documents. The successful bidder must complete and return this form when directed by Owner.

29. California Products.

Price, fitness, and quality being equal with regard to supplies, the Owner may prefer supplies grown, manufactured, or produced in California. The Owner may next prefer supplies partially grown, manufactured, or produced in California. Where the Owner has a preference, the bids of the suppliers or the prices quoted by them (i) must not exceed by more than five percent the lowest bids/prices quoted by out-of-state suppliers, (ii) the major portion of the manufacture of the supplies is not done outside of California, and (iii) the public good will be served. Refer to specifications for indications of Owner preferences. Government Code Sections 4330-4334.

30. <u>Contractor License And DIR Registration Required</u>.

To perform the work required for this project, Bidder must possess the type of contractor's license specified in the Notice to Contractors Calling for Bids, and must be registered with the Department of Industrial Relations (DIR) as a public works contractor. Contractor registration can be accomplished through the portal <u>https://efiling.dir.ca.gov/PWCR/.</u> No CONTRACTOR or subcontractor shall be qualified to bid on, be listed in a bid proposal, subject to the requirements of § 4104 of the Public Contract Code, for a public works project (submitted on or after March 1, 2015) unless currently registered with the DIR and qualified to perform public work pursuant to Labor Code § 1725.5. No CONTRACTOR or subcontractor may be awarded a contract for public work on a public works project (awarded after April 1, 2015) unless registered with the DIR.

31. Post-Bid Credits.

Should any bidder or proposed subcontractor to any bidder issue any credit or otherwise reduce its bid or quote pertaining to the work of this project, the value of the credit or other reduction shall be passed on to the Owner less only the applicable markups for profit and overhead as specified in the Contract Documents on change orders.

32. Contents of Bid.

The bid will include the following documents: Bid Form, List of Subcontractors, Substitution Listing form, Non-collusion Declaration, Exclusion of Asbestos and Lead Based Paint Products Certification, Contractors' Qualification Questionnaire (if required) Mandatory Prequalification Package (if required), Iran Contracting Act Certification (if required), Bid Bond or other bid security, and Certification of Attendance at Mandatory Job Walk, if a job walk is required on this project.

33. <u>Bid Protests</u>.

Any bidder having submitted a bid on the project may file a protest against the proposed contract award or challenging the validity of other bids. The protest must meet all the following requirements:

(a) The protest shall be submitted in writing and shall contain all the materials required by these provisions; one that does not contain all the required material shall not be recognized.

(b) The protest shall be received by the Owner no later than close of business on the second business day after bid opening; one received after that time shall not be recognized.

(c) Each protest shall contain the following:

(i) Identification by name, address, and telephone number of the protesting person(s), company and/or organization and identification of the project to which the protest pertains.

(ii) The protest shall set forth in detail all grounds for the protest, including without limitation all facts, identification by name of any other bids or bidders involved in the protest, all supporting documentation, together with any legal authorities and/or argument in support of the grounds for the protest. Any matters not set forth in the written protest shall be deemed waived. All factual contentions must be supported by competent, admissible, and credible evidence.

(d) Any protest not conforming to the requirements of this section shall be rejected as invalid.

(e) Where a protest is filed in conformity with this section, the Owner's staff, or such individual(s) as may be designated by the Owner, shall review and evaluate the basis of the protest and provide a written decision to the protesting bidder. The written decision shall either concur with or deny the protest.

(f) Submission of a written protest to and receipt of a written decision from the Owner staff shall be considered an administrative remedy, and failure to follow this procedure shall be a bar to any legal action.

(g) The written decision by the Owner's staff is not subject to arbitration, mediation, reconsideration, or further appeal. Any protest not involving a finding of non-responsibility shall be fully and finally decided by Owner's staff, and there shall be no right for a protesting bidder to appeal Owner's staff's written decision to the Owner's governing board unless such appeal concerns a finding on non-responsibility.

34. <u>Procedure for Protesting Being Deemed a Non-Responsible Bidder</u>.

Any bidder or prospective bidder deemed non-responsible after having submitted a bid may file an appeal of the action to the Owner's governing board or other governing body. The protest must meet all the following requirements:

(a) The appeal shall be submitted in writing, and shall contain all the materials required by these provisions; one that does not contain all the required material shall not be recognized.

(b) The appeal must be received by the Owner's governing board or other governing body within two business days of the action by Owner giving rise to the protest; one received after that time shall not be recognized.

(c) A hearing on the appeal shall be held before the Owner's governing board or other governing body prior to the award of contract.

(d) The decision of the Owner's governing board or other governing body is not subject to arbitration, mediation, reconsideration, or further appeal.

(e) Submission of a protest to and receipt of a decision from the Owner's governing board or other governing body shall be considered an administrative remedy, and failure to follow this procedure shall be a bar to any legal action.

35. <u>All Projects Over \$1,000 Are Subject to Prevailing Wage Monitoring and</u> <u>Enforcement by the Labor Commissioner</u>

The project is subject to prevailing wage monitoring and enforcement by the DIR, as indicated in the Notice Calling for Bids. The successful bidder and all subcontractors will be subject to the requirements of Subchapter 4.5 of Chapter 8 of Title 8 of the California Code of Regulations. The successful bidder and all subcontractors will be required to furnish certified payroll records to the Labor Commissioner on the frequency specified in the Notice Calling for Bids using the DIR's eCPR system. To access the DIR's eCPR system and to obtain additional information and assistance, bidders may go to DIR website

www.dir.ca.gov/Public-Works/Certified-Payroll-Reporting.html. Failure to timely submit certified payroll records may result in debarment from public works projects by the Labor Commissioner for a period of one to three years.

03-BID FORM

Name of Bidder:

Project: MOT Building

Project #: 2023-2314

To: Fairfax School District, referred to as "OWNER."

In compliance with your Notice to Contractors Calling for Bids and related Α. documents, the undersigned bidder, having familiarized itself with the terms of the contract, the local conditions affecting the performance of the contract, the cost of the work at the place where the work is to be done, and the drawings and specifications and other contract documents, proposes and agrees to perform the contract within the time stipulated, including all of its component parts and everything required to be performed, and to provide and furnish any and all of the labor, materials, tools, expendable equipment, and all applicable taxes, utility, and transportation services necessary to perform the contract and complete in a workmanlike manner all of the work required in connection with the above-referenced project, including sheeting, shoring, and bracing, or equivalent method for protection of life and limb in trenches and open excavation in conformance with applicable safety orders, within the time limits set for completion of all work, all in strict conformity with the drawings and specifications and other contract documents, including Addenda Nos. on file at the office of OWNER for the Base Bid sum of: [list all]

dollars. [written in words]

φ [written in numbers]

B. If any of the following alternate bids are utilized and awarded, the undersigned agrees to make price adjustments, as indicated, to the Base Bid.

ALTERNATE BID 1:

[description of alternate]

www.schoolslegalservice.org PUBLIC WORKS BID PACKET 1215 State the amount to be \Box **added** \Box **deducted** to/from the Base Bid for Alternate Bid 1. *[select one]*

dollars. [written in words]

\$ [written in numbers]

ALTERNATE BID 2:

[description of alternate]

State the amount to be \Box **added** \Box **deducted** to/from the Base Bid for Alternate Bid 2. *[select one]*

dollars. [written in words]

\$ [written in numbers]

ALTERNATE BID 3:

[description of alternate]

State the amount to be \Box **added** \Box **deducted** to/from the Base Bid for Alternate Bid 3. *[select one]*

dollars. [written in words]

\$

[written in numbers]

REFER TO ANY ATTACHMENTS TO THIS BID FORM FOR ADDITIONAL ALTERNATES

C. The Bidder agrees that upon written notice of acceptance of this bid, he will execute the contract and provide all bonds and other required documents within ten (10)

www.schoolslegalservice.org PUBLIC WORKS BID PACKET 1215 working days after contract award.

D. Attached is bid security not less than 10 percent of the bid, in the amount of \$, in the form of \Box (cash) \Box (bid bond) \Box (certified check) \Box (cashier's check).

[check one]

E. The Bidder acknowledges that OWNER reserves the right to accept or reject any and/or all Base Bids and alternate bids. This entire bid shall remain open and active for sixty (60) days after bid opening, and any alternate bids not initially awarded shall remain active, as an irrevocable offer by the Bidder to enter into either a change order or separate contract, for up to six months after award of the contract.

F. It is understood and agreed that if written notice of the acceptance of this bid is mailed, telegraphed, or delivered to the Bidder after the opening of the bid, and within the time this bid is required to remain open, or at any time after that before this bid is withdrawn, the Bidder will execute and deliver to OWNER the Agreement and will also furnish and deliver to OWNER the Performance Bond and a separate Payment Bond as specified, certificates of insurance, and other required documents.

G. It is understood and agreed that should the Bidder fail or refuse to return executed copies of the Construction Agreement, bonds, insurance certificates, and other required documents to OWNER within the time specified, the bid security shall be forfeited to OWNER.

H. In submitting this bid, the Bidder offers and agrees that if the bid is accepted it will assign to 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. Section 15) or under the Cartwright Act (Business & Professions Code Section 16700 and following sections) arising from purchases of goods, materials, or services by the Bidder for sale to OWNER pursuant to the bid. Such assignment shall be made and become effective at the time OWNER tenders final payment under the contract. (Public Contract Code Section 7103.5; Government Code Section 4552.)

I. The Bidder hereby certifies that it is, and at all times during the performance of work under the Contract Documents shall be, in full compliance with the provisions of the Immigration Reform and Control Act of 1986 ("IRCA") in the hiring of its employees, and the Bidder shall indemnify, hold harmless, and defend OWNER against any and all actions, proceedings, penalties, or claims arising out of the Bidder's failure to comply strictly with the IRCA.

J. The Bidder understands that a licensed contractor shall not submit a bid to a public agency unless the Bidder's contractor's license number appears clearly on the bid, the license expiration date is stated, and the bid contains a statement that the representations made therein are made under penalty of perjury. Any bid not containing this information,

or a bid containing information which is subsequently proven false, may be considered non-responsive and may be rejected by the public agency.

K. Bidder's contractor's license is:

[number] [class] [expires]

[DIR registration number] [expires]

L. Attached is Bidder's AB 1565 Prequalification Questionnaire Validation Form (if required by the Notice to Contractors Calling for Bids, paragraph 20, and the Instructions to Bidders, paragraph 36).

M. The undersigned hereby declares that all of the representations of this bid, including all documents comprising the bid package, are true and are made under penalty of the perjury laws of the State of California.

		INDIVIDUAL/DBA		
*Signature:				
Print Name:				
Business Ad	dress:			
Date:	Telephone:			
		PARTNERSHIP		
Partnership *By:	Name:		, Partner	
Print Name:				
Business Ad	dress:			
Date:	Telephone:			
Names of Ot	her Partners:			

CORPORATION	J
-------------	---

Corporation Name: , a Corporation. (State of Incorporation)	
Business Address:	
Date: Telephone:	
*By: [Required] (President/Chief Executive Officer/Vice President) [Circle One]	[Seal]
Print Name:	
*By: [Required] (Secretary/Treasurer/Chief Financial Officer/Assistant Treasurer) [0 Print Name:	Circle One]
JOINT VENTURE	
Joint Venturer Name:	
*Signed by:	_(Joint Venturer)
Print Name:	
Business Address:	
Date: Telephone:	
Other Parties to Joint Venture:	
If an individual joint venturer:	
*By: (Signature) Print Name:	
If a DBA joint venturer:	
*By: (Signature) Print Name:	

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If a partnership joint venturer: *By: Print Name:	(Signature)
If a Corporation joint venturer:	[Seal]
, (Name) a Corporation. (State of Incorporation)	
*By:	
Print Name:	

Title:

*Important Notice: Labor Code § 1771.1(a) provides that "A contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code, or engage in the performance of any contract for public work, as defined in this chapter, unless currently registered and qualified to perform public work pursuant to Labor Code Section 1725.5. It is not a violation of this section for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions Code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded." Please go to http://www.dir.ca.gov/Public-Works/PublicWorks.html for more information and to register. This project is subject to monitoring by the Department of Industrial Relations.

04-SUBSTITUTION LISTING

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

TO: Fairfax School District ("OWNER")

1. Pursuant to bidding and contract requirements for the work titled: **Project Title/Bid #: MOT Building / #2023-2314**

The contract sum, proposed by the undersigned on the Bid Form, is for the work as shown on the drawings, described in the specifications, and otherwise defined in the Contract Documents. However, the undersigned proposes the following substitutions for the Owner's consideration. Should the Owner accept any or all of the proposed substitutions, the Bidder agrees to reduce the contract sum by the amount shown. Proposed substitutions must be submitted not later than 10 working days prior to the date of bid opening in order for such request to be reviewed before bidding. All substitutions must be listed on this form and submitted prior to or with the bid or they will not be reviewed.

2. Please complete, attaching additional sheets as necessary:

Bidder proposes [check one]:

□ no substitutions.

 \Box the following substitutions:

Specified Product or Material	Drawing Number or Specification Section	Proposed Substitution	Proposed Price Reduction

3. All bids should be calculated and submitted on the assumption that substitution requests will not be approved.

4. Bidder hereby certifies that the requested substitutions are equal or better in all respects to what is specified, unless otherwise noted.

Print Name:

SIGNATURE MUST BE IDENTICAL	BIDDER:
TO THAT PROVIDED ON BID FORM	
	Ву:

www.schoolslegalservice.org PUBLIC WORKS BID PACKET 1214 SUBSTITUTION LISTING PAGE OF 2

05-LIST OF SUBCONTRACTORS

TO BE SUBMITTED WITH BID

PROJECT TITLE: BID #: MOT Building / #2023-2314 OWNER: Fairfax School District

A. In compliance with the Subletting and Subcontracting Fair Practices Act (Public Contract Code Section 4100 and following sections) and any amendments to the Act, each Bidder shall set forth below:

1. The name, location of the place of business California contractor license number and DIR registration number of:

a. Each subcontractor who will perform work or labor or render service to the Bidder in or about the construction of the work or improvement to be performed under the Construction Agreement;

b. Each subcontractor licensed by the State of California who, under subcontract to the Bidder, specially fabricates and/or 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 one percent of the Bidder's total bid or Ten Thousand Dollars (\$10,000), whichever is greater;

2. The portion of the work which will be done by each subcontractor.

B. The Bidder shall list only one subcontractor for each such portion as is defined by the Bidder in this bid.

C. If the Bidder fails to specify a subcontractor, or if the Bidder specifies more than one subcontractor for the same portion of work to be performed under the contract in excess of one-half of one percent of the Bidder's total bid, the Bidder shall be deemed to have agreed that the Bidder is fully qualified to perform that portion, and that the Bidder alone shall perform that portion.

D. No Bidder whose bid is accepted shall (i) substitute any subcontractor, (ii) permit any subcontractor to be voluntarily assigned or transferred, or allow it to be performed by anyone other than the original subcontractor listed in the original bid, or (c) sublet or subcontract any portion of the work in excess of one-half of one percent of the Bidder's total bid as to which the original bid did not designate a subcontractor, except as authorized in the Subletting and Subcontracting Fair Practices Act.

E. Violations of any provision of the Subletting and Subcontracting Fair Practices Act may be deemed by the OWNER to make the bid non-responsive and/or the Bidder non-responsible.

F. Attach additional sheets, as necessary.

SUBCONTRACTOR'S NAME & LOCATION	DESCRIPTION OF PORTION TO BE SUBCONTRACTED	CALIFORNIA CONTRACTOR LICENSE NO.	DIR REGISTRATION NUMBER

Firm Name:

By: ______[Signature must match that on bid]

Print Name:

06-BID BOND

IF USED BY BIDDER, MUST BE COMPLETED AND SUBMITTED WITH BID

PROJECT TITLE/BID #: MOT Building / #2023-2314 OWNER: Fairfax School District

KNOW ALL MEN BY THESE PRESENTS, that we, as Principal, and as Surety, are held and firmly bound unto the (referred to as Owner) in the sum of percent of the total amount of the bid of the Principal submitted to the Owner for the work and obligations described below for the payment of which sum in lawful money of the United States, well and truly to be made, we jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

The condition of this obligation is such that whereas the Principal has submitted the accompanying bid dated , 20 , for: \$

NOW, THEREFORE, if the Principal shall not withdraw said bid within the period specified therein after the opening of the same, or if no period be specified, within 60 days after said opening; and if the Principal is awarded the contract, and shall within the specified period, or if no period is specified, within five working days after the award of the contract, enter into a written contract with the Owner in accordance with the bid as accepted and give bonds with good and sufficient surety or sureties as may be required for the faithful performance and proper fulfillment of such contract, provide certificates evidencing the required insurance is in effect (in the amounts required in the contract documents), and provide any other documents required under the contract documents to be submitted at the time the contract is executed, then the above obligation shall be void and of no effect, otherwise to remain in full force and effect.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the contract or the call for bids, or to the work to be performed thereunder, 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 the event suit is brought upon this bond by the Owner and judgment is recovered, the Surety shall pay all costs incurred by the Owner in such suit, including a reasonable attorney's fee to be fixed by the court.

IN WITNESS WHEREOF, the parties have executed this instrument under their several seals this day of , 20 , the name and corporate party being hereto affixed and duly signed by its undersigned authorized representative.

DATED:	PRINCIPAL
	Ву:
	Title:
DATED:	SURETY
	Ву:
	Title:

Note: Signatures of those executing for the Surety must be properly acknowledged.

07-NONCOLLUSION DECLARATION TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

PROJECT TITLE/BID #: MOT Building / #2023-2314

OWNER: Fairfax School District

The undersigned declares:

, the party making the foregoing bid. The bid is not made in the I am the of 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 [date], at [city], [state].

Contractor:

By_____

Title: Signature:_____
08-EXCLUSION OF LEAD AND ASBESTOS PRODUCTS

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

PROJECT TITLE/BID #: MOT Building / #2023-2314 OWNER: Fairfax School District

Pursuant to the provisions of the California Education Code for construction, modernization, or renovation of school facilities, lead based paint, lead plumbing, and solders, or other potential sources of lead contamination shall not be utilized in the construction of any new school facility or the modernization or renovation of any existing school facility.

The Contractor agrees that sources and potential sources of lead contamination, whether in products or materials, will not be used in performing work under the Agreement.

In addition, the Contractor agrees that asbestos containing products or materials will not be used in performing work under the Agreement.

At completion of work under the Agreement, the Contractor will warrant and represent to the Owner the following:

- 1. That no asbestos containing products or materials, or sources or potential sources of lead contamination, were used in performing work under the Agreement.
- 2. That should any asbestos containing products, or sources or potential sources of lead contamination, be found to have been used by the Contractor or any subcontractor, supplier, or vendor on the Project, the Contractor will replace them, together with all related materials, at no cost to the Owner.
- 3. That should the replacement require any interruption in the normal operation of the school, the Contractor will pay all costs necessarily incurred to keep the school functioning with the least possible disruption to its day-to-day operations.

Executed at , California, on , 20

Firm Name:

By: Title:

Signed: ____

[Signature must match that on bid]

09-CONSTRUCTION AGREEMENT

THIS AGREEMENT, dated , in the County of Kern, State of California, is by and between the Fairfax School District ("OWNER") and ("CONTRACTOR").

For the consideration stated in this Agreement, OWNER and CONTRACTOR agree as follows:

1. <u>Contract Documents</u>. The complete Agreement includes all of the Contract Documents as defined in the General Conditions and any other documents comprising any portion of the bid package, and all modifications, addenda, and amendments of or to any of these documents, all of which are incorporated by reference into this Agreement. The Contract Documents are complementary, and what is called for by any one shall be as binding as if called for by all.

2. <u>Scope of Performance</u>. CONTRACTOR shall perform within the time set forth in Paragraph 4 of this Agreement everything required to be performed, and shall provide and furnish all labor, materials, necessary tools, expendable equipment, and all utility and transportation services described in the Contract Documents and required for construction of MOT Building / #2023-2314.

All of the work to be performed and materials to be furnished shall be completed in a good workmanlike manner in strict accordance with the Plans, Drawings, Specifications and all provisions of the Contract Documents as defined above. CONTRACTOR shall be liable to OWNER for any damages arising as a result of a failure to fully comply with this obligation, and CONTRACTOR shall not be excused with respect to any failure to so comply by any act or omission of OWNER, the Architect, Engineer, Inspector, Division of State Architect, or representative of any of them, unless such act or omission actually prevents CONTRACTOR from fully complying with the requirements of the Contract Documents, and unless CONTRACTOR protests at the time of the alleged prevention that the act or omission is preventing CONTRACTOR from fully complying with the Contract Documents. The protest shall not be effective unless reduced to writing and filed with OWNER within three working days of the date of occurrence of the act or omission preventing CONTRACTOR from fully complying with the Contract Documents.

3. <u>Contract Price</u>. Subject to any additions or deductions as provided in the Contract Documents, as full consideration for the faithful performance of the contract OWNER shall pay to CONTRACTOR the sum of \$

4. <u>Construction Period</u>. The work shall be commenced on or before the 5th day after receiving OWNER's Notice to Proceed and shall be completed within 200 consecutive calendar days from the date specified in the Notice to Proceed.

5. <u>Liquidated and Other Damages</u>. All work must be completed within the time limits set forth in the Contract Documents. If the work is not completed in accordance with the time limits

set forth in this Agreement, in accordance with Government Code Section 53069.85, CONTRACTOR shall pay to OWNER as fixed and liquidated damages, and not as a penalty, the sum of \$1,000.00 for each calendar day of delay until work is completed and accepted.

Detailed requirements concerning liquidated damages and other damages which may be assessed if CONTRACTOR fails to complete the project within the time period provided in this Agreement are contained in the General Conditions.

6. <u>Insurance</u>. Prior to commencing the work, CONTRACTOR shall take out and maintain during the life of this contract, and shall require all subcontractors, if any, whether primary or secondary, to take out and maintain all insurance as required in the General Conditions.

7. <u>Substitution of Securities</u>. Public Contract Code Section 22300 permits the substitution of securities for any monies withheld by a public agency to ensure performance under a contract. At the request and expense of CONTRACTOR, securities equivalent to the amount withheld shall be deposited with the public agency, or with a state or federally chartered bank in California as the escrow agent, who shall then pay such monies to CONTRACTOR. OWNER retains the sole discretion to approve the bank selected by CONTRACTOR to serve as escrow agent. Upon satisfactory completion of the contract, the securities shall be returned to CONTRACTOR. Securities eligible for investment shall include those listed in Government Code Section 16430 or bank or savings and loan certificates of deposit. CONTRACTOR shall be the beneficial owner of any securities substituted for monies withheld and shall receive any interest thereon.

In the alternative, under Section 22300, CONTRACTOR may request OWNER to make payment of earned retentions directly to the escrow agent at the expense of CONTRACTOR. Also at CONTRACTOR's expense, CONTRACTOR may direct investment of the payments in securities, and CONTRACTOR shall receive interest earned on such investment upon the same conditions as provided for securities deposited by CONTRACTOR. Upon satisfactory completion of the contract, CONTRACTOR shall receive from the escrow agent all securities, interest, and payments received by escrow agent from OWNER pursuant to the terms of Section 22300. Not later than 20 days after receipt of such payment, CONTRACTOR shall pay to each subcontractor the respective amount of interest earned, net of costs attributed to retention withheld from each subcontractor, on the amount of retention withheld to ensure performance of CONTRACTOR.

8. <u>Corporate Status and Authorization</u>. If CONTRACTOR is a corporation, the undersigned hereby represents and warrants that the corporation is duly incorporated and in good standing in the State of California and that , whose title is , is authorized to act for and bind the corporation.

9. <u>Posting</u>. Contractor shall be responsible to post job site notices prescribed by Title 8 CCR § 16451 (d) pertaining to prevailing wage monitoring by the Department of Industrial Relations.

10. <u>Entire Agreement</u>. This Agreement, including the Contract Documents incorporated by reference, constitutes the final, complete, and exclusive statement of the terms of the agreement

between the parties pertaining to construction of the project. It supersedes all prior and contemporaneous understandings or agreements of the parties. No party has been induced to enter into this Agreement by, nor is any party relying on, any representation or warranty outside those expressly set forth in this Agreement. The Agreement can only be modified by an amendment in writing, signed by both parties and approved by action of OWNER's governing board or other governing body.

11. <u>Parties in Interest</u>. Nothing in this Agreement, whether express or implied, is intended to confer any rights or remedies under or by reason of this Agreement on any person other than the parties to this Agreement and their respective successors and assigns. Nothing in this Agreement, whether express or implied, is intended to relieve or discharge the obligation or liability of any third person to any party to this Agreement, nor shall any provision give any third person any right of subrogation or action against any party to this Agreement.

12. <u>Severability</u>. If any provision of this Agreement is held by a court of competent jurisdiction to be invalid or unenforceable, the remainder of the Agreement shall continue in full force and effect and shall in no way be impaired or invalidated.

13. <u>Governing Law</u>. The rights and obligations of the parties and the interpretation and performance of this Agreement shall be governed by the laws of California, excluding its conflict of laws rules.

The parties have executed this Agreement by the signatures of their authorized representatives effective the date indicated above.

DISTRICT	CONTRACTOR
By: Signature	*By: Signature
Print Name Above	Print Name Above
Print Title Above	Print Title Above
[Continued on Following Page]	
[CORPORATE SEAL OF CONTRACTOR, if a corporation]	Contractor's License No.
	Tax ID/Social Security No.
	DIR Registration No.

*Important Notice: Labor Code § 1771.1(a) provides that "A contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code, or engage in the performance of any contract for public work, as defined in this chapter, unless currently registered and qualified to perform public work pursuant to Labor Code Section 1725.5. It is not a violation of this section for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions Code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded." Please go to http://www.dir.ca.gov/Public-Works/PublicWorks.html for more information and to register. This project is subject to monitoring by the Department of Industrial Relations.

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PROJECT TITLE/ BID #: MOT Building / #2023-2314 OWNER: Fairfax School District

ARTICLE 1 DEFINITIONS

A. <u>Action of the Governing Board or Other Governing Body</u>: An official act of the governing board or other governing body of OWNER.

B. <u>Approve</u>: The term "approve," where used in conjunction with the Architect's action on the CONTRACTOR'S submittals, applications, and request, is limited to the responsibilities and duties of the Architect stated in General and Supplementary Conditions. Approval shall not release CONTRACTOR from responsibility to fulfill Contract Document requirements, unless otherwise provided in the Contract Documents.

C. <u>Architect</u>: The person, persons, or entity selected by OWNER to provide architectural services to the Project. Architect is an independent contractor and is not an agent of OWNER.

Contract Documents: All contract documents, including all official documents on D. this Project, including the Notice Calling for Bids, Instructions to Bidders, Bid Form, Designation of Subcontractors, Workers' Compensation Certificate, Performance Bond, Payment Bond, Change Orders, Shop Drawings and their Transmittals, Information Required of Bidder, all pregualification forms submitted pursuant to Public Contract Code sections 20111.5 or 20111.6, if any, Substitution Listing form on any approved substitutions. Non-Collusion Declaration. Insurance Certificates. Guarantees, Contractor's Certificate Regarding Non-Asbestos and/or Lead Containing Materials, if any, Davis-Bacon Compliance Certification, Fingerprinting Certifications, Labor Compliance Program documents, General Conditions, Supplemental General Conditions, if any, Iran Contracting Act Certification, if any, Special Conditions and/or Requirements, if any, Plans, Drawings, Specifications, the Construction Agreement, and all Modifications, addenda, and amendments of those documents.

- E. <u>Modification</u>:
 - 1. A written amendment to the Contract Documents signed by both parties;
 - 2. A fully executed Change Order;
 - 3. A written interpretation issued by the Architect; or
 - 4. A written order for a minor change in the Work issued by the Architect.

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F. <u>CONTRACTOR</u>: That entity awarded this Construction Agreement by official action of OWNER. Throughout the Contract Documents CONTRACTOR is treated as being of singular number and neuter gender.

G. <u>Date of Acceptance</u>: The date when all of the following conditions are satisfied:

1. OWNER is able to occupy all portions of the project.

2. The notice of completion is recorded with local authorities.

3. The final verified report is filed with the Division of State Architect of the Department of General Services.

4. Acceptance of project by OWNER's governing board or other governing body.

H. <u>Days</u>: Calendar days unless noted otherwise.

I. <u>Equivalent to</u>: Equal or superior in function and quality and approved by the Architect.

J. <u>Furnish</u>: Means "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations."

K. <u>Indicated</u>: Refers to graphic representations, notes or schedules on the Drawings, or other Paragraphs or Schedules in Specifications, and similar requirements in Contract Documents. Where terms such as "shown," "noted," or "scheduled" are used, it is to help locate the reference; no limitation on locations is intended except as specifically noted.

L. <u>Install</u>: Used to describe operations at the project site, including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations."

M. <u>Installer</u>: An entity engaged by CONTRACTOR, either as an employee, subcontractor, or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar required operations. Installers are required to be experienced in the operations they are engaged to perform and licensed as required in the individual specification sections.

N. <u>Liquidated Damages</u>: Pursuant to Government Code Section 53069.85, this is the specified sum of money that CONTRACTOR shall forfeit and pay to OWNER for those

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specified portions of the Project that are uncompleted and delayed beyond the stated completion time.

O. <u>Or Equal</u>: Where named products in specification text are accompanied or are deemed by law to be followed by the term "or equal," or other language of similar effect, CONTRACTOR shall comply with those Contract Document provisions for "substitutions" when obtaining Architect's review and consideration.

P. <u>OWNER</u>: The school district, community college district, County Superintendent of Schools, or other public entity executing the Construction Agreement acting through its governing board or other governing body.

Q. <u>Plans</u>: The reproductions of the official drawings adopted and approved by OWNER showing locations, character, dimensions, and details of the work.

R. <u>Project</u>: The undertaking planned by OWNER and CONTRACTOR as provided in the Contract Documents.

S. <u>Project Inspector/Inspector of Record</u>: Any individual or firm retained by OWNER as the on-site inspector for a particular project hired by and paid by OWNER and under general direction of the Architect or registered engineer in charge. The Project Inspector shall be responsible for inspecting all work included in the Contract Documents. A special inspector shall be responsible only for inspecting the work for which he/she is approved. Inspectors are independent contractors and are not agents or employees of OWNER.

T. <u>Project Manual</u>: The volume(s) that include the bidding requirements, sample forms, and all of the initial Contract Documents, such as Conditions of the Contract, Schedules and Details Manual, the Specifications, and the addenda to be used on the Project.

U. <u>Project Site</u>: The space available to CONTRACTOR for performance of the Work, either exclusively or in conjunction with others performing other construction as part of the Project. The extent of the Project Site is shown on the Drawings, and may or may not be identical with the description of the land upon which the Project is to be built.

V. <u>Provide</u>: Includes "provide complete in place," that is, furnish and install.

W. <u>Refer</u>: Indicates that the subject is defined or specified in further detail at another location in the Contract Documents or elsewhere as indicated. Except, as otherwise noted, "refer" does not imply that CONTRACTOR must purchase or subcontract the subject work in any special manner.

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X. <u>Related Work in Other Sections</u>: A nonrestrictive term used throughout the Specifications to coordinate the Work and facilitate checking and bidding.

Y. <u>Required</u>: As required by Contract Documents.

Z. <u>Safety Orders</u>: Issued by Division of Industrial Safety and OSHA Safety and Health Standards for Construction.

AA. <u>Specification</u>: The printed instruction and requirements which complement the plans as to the methods and manner of performing the Work or to the quantities and qualities of the materials to be furnished.

BB. <u>Subcontractor</u>: Includes those having a direct contract with the CONTRACTOR and those who furnish material worked to a special design according to plans, drawings, and Specifications of this work, but does not include those who merely furnish material not so worked.

CC. <u>Surety</u>: The firm or corporation executing CONTRACTOR'S Performance Bond and/or Payment Bond as surety, as the context indicates.

DD. <u>Testing Laboratory</u>: An independent entity engaged to perform specific inspections or test, either at the Project Site or elsewhere, and to report on, and if required, interpret results of those inspections or tests. It is not an agent of OWNER.

EE. <u>Unfinished</u>: Refers to the status of the Work prior to reaching completion, as described in Article 61.

FF. <u>Work</u>: Work of the CONTRACTOR and subcontractors, including all labor or materials (including without limitation, equipment, and appliances), both incorporated in, or to be incorporated in the Project in order to fully meet the requirements of the Contract Documents.

ARTICLE 2 STATUS OF CONTRACTOR

A. CONTRACTOR is and shall at all times be deemed to be an independent contractor and shall be wholly responsible for the manner in which it performs the services required of it by the terms of the Contract Documents.

B. Nothing contained in the Contract Documents shall be construed as creating the relationship of employer and employee, or principal and agent, between OWNER and CONTRACTOR or any of CONTRACTOR'S agents or employees.

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C. CONTRACTOR exclusively assumes the responsibility for the acts of its employees as they relate to the services to be provided during the course and scope of their employment. CONTRACTOR, its agents, and employees shall not be entitled to any rights or privileges of OWNER employees and shall not be considered in any manner to be OWNER employees.

D. OWNER shall be permitted to monitor the activities of CONTRACTOR to determine compliance with the terms of the Contract Documents.

E. Contractors are required by law to be licensed and regulated by the Contractors' State License Board. Any contractor not so licensed is subject to penalties under the law and the Construction Agreement will be considered void pursuant to Business and Professions Code Section 7028.7. Any questions concerning a contractor may be referred to the Registrar, Contractors' State License Board, 3132 Bradshaw Road, Post Office Box 2600, Sacramento, California, 95826.

F. Contractors or subcontractors are not qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code, or engage in the performance of any contract for public work, as defined in this chapter, unless currently registered and qualified to perform public work pursuant to Labor Code Section 1725.5. This project is subject to monitoring by the Department of Industrial Relations.

ARTICLE 3 CONTRACTOR SELECTION PROCESS AND PROHIBITED INTERESTS

A. As a means of maintaining the integrity of the formal selection process, contacts with individual members of OWNER's Board of Trustees or governing body on behalf of any bidding firm relative to this Project will be considered inappropriate.

B. No official of OWNER who is authorized in such capacity and on behalf of OWNER to negotiate, make, accept, or approve, or to take part in negotiating, making, accepting or approving, any architectural, engineering, inspection, construction, or material supply contract, or any subcontract in connection with construction of the Project, shall have any direct or indirect financial interest in any part of this Project.

C. No officer, employee, architect, attorney, engineer. or inspector of or for OWNER who is authorized in such capacity and on behalf of OWNER to exercise any executive, supervisory, or other similar functions in connection with construction of the Project shall have any direct or indirect financial interest in any part of this Project.

D. CONTRACTOR shall receive no compensation and shall repay OWNER for any compensation received should CONTRACTOR aid, abet, or knowingly participate in any violation of this Article.

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ARTICLE 4 CHANGE IN NAME OR NATURE OF CONTRACTOR'S LEGAL ENTITY

Before CONTRACTOR makes any change in the name or legal nature of the CONTRACTOR'S entity, CONTRACTOR shall first notify OWNER in writing and cooperate with OWNER in making such changes as OWNER may request in the Contract Documents.

ARTICLE 5 DEBARRED CONTRACTOR

A. Pursuant to Labor Code Sections 1777.1 and 1777.7, a contractor may be prohibited from bidding or performing work as a subcontractor on a public works project.

B. Any contract on a public works project entered into between a contractor and a debarred subcontractor is void as a matter of law. A debarred subcontractor may not receive any public money for performing work as a subcontractor on a public works contract, and any public money that may have been paid to a debarred subcontractor by a contractor on the Project shall be returned to the awarding body. The contractor shall be responsible for the payment of wages to workers of a debarred subcontractor who has been allowed to work on the Project.

C. Pursuant to Public Contract Code Section 4701, CONTRACTOR shall request the substitution of any subcontractor who has been debarred by the California Labor Commissioner from working as a subcontractor on public work.

ARTICLE 6 SUBCONTRACTING

A. CONTRACTOR agrees to bind each and every subcontractor to the terms of the Contract Documents as far as the terms are applicable to the subcontractor's work. Each subcontract shall contain a reference to Contract Documents, and the terms of the Contract Documents shall be incorporated into and made a part of each subcontract. If CONTRACTOR subcontracts any part of its work under the Construction Agreement, CONTRACTOR shall be responsible to OWNER for any acts and omissions of its subcontractors and of persons either directly or indirectly employed by its subcontractors. Nothing contained in the Contract Documents shall create any contractual relationship between any subcontractor and OWNER.

B. OWNER'S consent to or approval of any subcontractor shall not in any way relieve CONTRACTOR of its obligations under the Contract Documents, and no such consent or approval shall be deemed to waive any provision of the Contract Documents.

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C. CONTRACTOR must submit with its bid a Designation of Subcontractors. If CONTRACTOR specifies more than one subcontractor for the same portion of work or fails to specify a subcontractor, and such portion of the work exceeds one-half of one percent of the total bid, CONTRACTOR agrees that it is fully qualified to perform and shall perform such work itself. The substitution or addition of subcontractors shall be permitted only as authorized by Public Contract Code Sections 4100, et seq.

D. All subcontractors shall be appropriately licensed and registered with DIR to perform the work for which employed in conformity with the laws of the State of California.

E. In accordance with California Business and Professions Code Section 7059, if CONTRACTOR is designated as a "specialty contractor" (as defined in Public Contract Code Section 7058), all of the work to be performed outside of the Contractor's license specialty, except "incidental" work as that term is used in Section 7059(a), shall be performed by a licensed subcontractor in compliance with the Subletting and Subcontracting Fair Practices Act, California Public Contract Code Section 4100, et seq.

F. A copy of each subcontract, if in writing, or if not in writing, then a written statement signed by the Contractor giving the name of the subcontractor and the terms and conditions of such subcontract, shall be filed with OWNER before the subcontractor begins work. Each subcontract will provide for termination in accordance with these General Conditions. Each subcontract shall provide for its annulment by CONTRACTOR at the order of the Architect if in the Architect's opinion the subcontractor fails to comply with the requirements of the Contract Documents insofar as the same may be applicable to this work.

G. Nothing contained in these General Conditions shall relieve CONTRACTOR of any liability or obligation under the Contract Documents, nor shall any permissible substitution or addition of a subcontractor result in any increase in the contract price or in an extension of time for completion of the Project.

H. CONTRACTOR shall require subcontractors to include the provisions of this article in their sub-subcontracts, if any.

I. Each subcontract applicable to this Project is hereby assigned to OWNER, such assignment to become effective only upon termination of the Construction Agreement for cause pursuant to the Contract Documents, and only as to such subcontracts as OWNER may, in its sole discretion, select and provide written notice of such assignment, and such assignments are subject to the rights and obligations of the surety on any applicable bonds, as detailed in the Contract Documents.

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ARTICLE 7 ARCHITECT'S STATUS

A. The Architect shall be OWNER's representative during construction and shall observe the progress and quality of the Work on behalf of OWNER. The Architect shall have the authority to act on behalf of OWNER only to the extent expressly provided in the Contract Documents. The Architect shall have authority to stop work whenever necessary, in the Architect's reasonable opinion, to ensure the proper execution of the Work of the Project.

B. The Architect shall be, in the first instance, the judge of the performance of the Work. The Architect shall exercise authority under the Contract Documents to enforce CONTRACTOR's faithful performance.

C. The Architect shall have all authority and responsibility established by law, including Title 24 of the California Code of Regulations. The Architect has the authority to enforce compliance with the Contract Documents and CONTRACTOR shall promptly comply with instructions from the Architect or an authorized representative of the Architect.

D. On all questions related to quantities, acceptability of material, equipment, or workmanship, execution, progress, or sequence of work, the interpretation of plans, specifications, or drawings, and the acceptable performance of CONTRACTOR, the decision of the Architect shall govern and shall be a condition precedent to any payment, unless otherwise ordered by OWNER. CONTRACTOR shall not impair or delay the progress and completion of the Work by virtue of any question or dispute arising out of or related to the foregoing matters, or the instructions of the Architect relating to them.

E. General supervision and direction of the Work by the Architect shall in no way imply that the Architect or its representatives are in any way responsible for the safety of CONTRACTOR or its employees or that the Architect or its representatives will maintain supervision over CONTRACTOR'S construction methods, means, or personnel other than to ensure that the quality of the finished work is in accordance with the Contract Documents.

ARTICLE 8 PROJECT INSPECTOR AND INSPECTOR FACILITIES

A. One or more Project Inspectors ("IOR"), including specialty Inspectors as required, employed by OWNER and operating under direction of the Architect, in accordance with the requirements of the California Code of Regulations Titles 21 and 24, will be assigned to the Work. All work shall be performed under the observation of or with the knowledge of the Project Inspector. The Project Inspector shall have free access to all parts of the Work at any time. CONTRACTOR shall furnish the Project Inspector with such

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information as may be necessary to keep the Project Inspector fully informed regarding the progress and manner of work and the character of materials.

B. Observations by the Project Inspector shall not in any way relieve CONTRACTOR from responsibility for full compliance with all terms and conditions of the Contract Documents, or be construed to lessen to any degree CONTRACTOR's responsibility for providing efficient and capable superintendence.

C. The Project Inspector is not authorized to make changes in the drawings or Specifications, nor shall the Project Inspector's approval of the Work and methods relieve CONTRACTOR of responsibility for the correction of subsequently discovered defects, or from its obligation to fully comply with the Contract Documents.

ARTICLE 9 COPIES FURNISHED

CONTRACTOR will be furnished five copies of the drawings and specifications free of charge. Additional copies may be obtained for the cost of reproduction.

ARTICLE 10 OWNERSHIP OF DRAWINGS

All documents prepared on behalf of OWNER including, without limitation the Plans, Specifications, drawings, and other documents, are instruments of service of the Architect and/or its consultants and are the property of OWNER. Neither CONTRACTOR nor any Subcontractor, Sub-subcontractor, material or equipment supplier or anyone else shall own or claim a copyright in such documents. Unless otherwise indicated, the Architect shall be deemed the author of such documents. Such documents are furnished to CONTRACTOR for use solely with respect to this Project, and are not to be used for any other purpose by CONTRACTOR or any Subcontractor, Sub-subcontractor, or material or equipment supplier, or anyone claiming through them without the express written consent of OWNER. CONTRACTOR, Subcontractors, Sub-subcontractors, and material or equipment suppliers are granted a limited license to use and reproduce applicable portions of the documents for use in the execution of their work under the Contract Documents.

ARTICLE 11 DOCUMENTS ON WORK

A. CONTRACTOR shall keep one copy of all Contract Documents, including addenda, change orders, shop drawings, and other modifications, and Titles 19, 21, and 24 of the California Code of Regulations, on the job at all times. The documents shall be kept in good order and accurately marked to record all changes made during construction. The documents shall be available to the Architect and its representatives at all times.

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B. CONTRACTOR shall be acquainted with and comply with all statutes and regulations as they relate to this Project. (See particularly the duties of Contractor, Title 24 California Code of Regulations, Sections 4-343.) CONTRACTOR shall also be acquainted with and comply with all provisions of the California Code of Regulations relating to conditions on this Project, particularly Titles 8 and 17.

ARTICLE 12 DRAWINGS AND SPECIFICATIONS

A. Drawings and Specifications are intended to delineate and describe the Project and its component parts sufficiently to enable skilled and competent contractors to intelligently bid upon the work, and to carry the Work to a successful and timely conclusion.

B. Organization of the Specifications into divisions, sections, and articles, and arrangement of drawings, shall not control CONTRACTOR in dividing the Work among subcontractors or in establishing the extent of work to be performed by any trade.

C. The drawings and Specifications 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 could have been shown.

D. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all. The Contract Documents are intended to encompass all labor and materials, equipment, and transportation necessary for proper execution 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 in both.

E. All materials or labor for the Work which are shown either by the Drawings or the Specifications (or are reasonably inferable from the Drawings or the Specifications as being necessary to complete the work) shall be provided by CONTRACTOR, whether or not the work is expressly covered in either the Drawings and/or the Specifications. It is intended that the Work be of sound, quality construction. CONTRACTOR must furnish adequate labor and materials to cover installation of all items indicated, described, or implied in the portion of the Work to be performed.

F. Drawings and Specifications are intended to comply with all laws, ordinances, rules and regulations of authorities having jurisdiction, and where referred to in the Contract

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Documents, such laws, ordinances, rules and regulations shall be considered as a part of the Contract Documents within the limits specified. If CONTRACTOR observes that the drawings or Specifications are contrary to applicable law, ordinance, rule or regulation, CONTRACTOR shall immediately notify the Architect in writing, and any changes deemed necessary by the Architect shall be made as provided in the Contract Documents for changes in work. If CONTRACTOR performs any work which CONTRACTOR knows or through the exercise of reasonable diligence should have known to be contrary to any law, rule, regulation, or ordinance without seeking and obtaining clarification, CONTRACTOR shall bear any and all costs arising from it, including without limitation the costs of correction without increase or adjustment to the contract price or the time for performance.

G. Materials or work described in words which have a well known technical or trade meaning shall be deemed to refer to those recognized standards.

H. It is not the intention of the Contract Documents to go into detailed descriptions of any materials and/or methods commonly known to the trade under "trade name" or "trade term." The mere mention or notation of such "trade name" or "trade term" shall be considered a sufficient notice to CONTRACTOR that it will be required to complete the Work so named with all its incidental and accessory items according to the best practices of the trade.

I. Naming any material and/or equipment requires CONTRACTOR to furnish and install the named material/equipment, including all incidental and accessory items and/or labor necessary to achieve full and complete functioning of the material and/or equipment according to the best practices of the trade(s) involved, unless specifically noted otherwise.

J. Figured dimensions on drawings shall govern, but work not dimensioned shall be as directed. Work not particularly shown or specified shall be the same as similar parts that are shown or specified. Large scale drawings shall take precedence over smaller scale drawings as to shape and details of construction. Specifications shall govern as to materials, workmanship, and installation procedures, provided however that the drawing or specification calling for the higher quality material or workmanship shall prevail, without additional cost to OWNER.

K. In case of inconsistencies in the descriptions of work to be done, equipment to be provided or material to be used, it is intended that the more stringent, higher quality, and greater quantity of work shall apply, without additional cost to OWNER.

L. All items indicated on the drawings or in the Specifications as future items require CONTRACTOR to provide all the mechanical, electrical, and other necessary service

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hookups or provisions required to make the equipment function as intended. Such items shall be provided to the location where the future item is indicated to be installed.

M. In the event of an inconsistency between the Construction Agreement or General Conditions and the other various Contract Documents, the Construction Agreement or General Conditions shall control.

N. Drawings and specifications are intended to be fully cooperative and to agree. If CONTRACTOR observes that drawings and Specifications are in conflict, CONTRACTOR shall promptly notify the Architect in writing, requesting clarification. Should CONTRACTOR commence work on any part of the Work without seeking clarification, CONTRACTOR waives any claim for extra work or damages as a result of any ambiguity, conflict, or lack of information. Questions regarding interpretation of drawings and Specifications shall be clarified by the Architect in writing.

O. If 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 to be done 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 resulting costs, including without limitation the costs of correction without increase or adjustment to the contract price or the time for performance.

P. Should clarification by the Architect be deemed new or additional work, the cost shall be adjusted as provided in these General Conditions for "Changes and Extra Work," provided however that requirements calling for the higher quality material or workmanship shall prevail without additional cost to OWNER or time adjustment.

Q. In the event the Architect determines that CONTRACTOR's requests for clarification or interpretation are not justified, or do not reflect adequate, competent supervision or knowledge by CONTRACTOR, or by the subcontractors, CONTRACTOR shall be required to pay the Architect's reasonable and customary fees in processing and responding to such requests.

R. Some drawings or other documents may be required of CONTRACTOR. If CONTRACTOR performs, permits, or causes the performance of any work under the documents prepared by or on the behalf of CONTRACTOR which document 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 price or the time for performance. In no case shall any subcontractor proceed with the work if uncertain without CONTRACTOR'S written direction and/or approval.

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S. If it is found at any time, whether before or after completion of the work, that CONTRACTOR has varied from the drawings and/or Specifications in materials, quality, form, or finish, or in the amount or value of the materials and labor used, the Architect shall make a recommendation either: (1) that all such improper work should be removed, remade, and replaced, and all work disturbed by these changes be made good at CONTRACTOR'S sole expense; or (2) that OWNER deduct from any amount due CONTRACTOR the sum of money equivalent to the difference in value between the work performed and that called for by the drawings and Specifications. The Architect shall determine such difference in value. At its option, OWNER may pursue either recommendation made by the Architect.

ARTICLE 13 DETAIL DRAWINGS AND SPECIFICATIONS

A. In case of ambiguity, conflict, or lack of information, the Architect shall furnish additional instructions, by means of drawings or otherwise, necessary for proper execution of the Work. All drawings and instructions shall be consistent with the Contract Documents, true developments of them, and reasonably inferable from them. Any additional instructions shall be furnished with reasonable promptness, provided that CONTRACTOR informs the Architect of the relationship of the request to the critical path of construction.

B. Work shall be executed in conformity with the Contract Documents and CONTRACTOR shall do no work without proper drawings and instructions.

C. The Architect will furnish necessary additional details to more fully explain the work, which shall be considered as part of the Contract Documents.

D. Should any details be more elaborate, in the opinion of CONTRACTOR, than scale drawings and specifications warrant, CONTRACTOR shall give written notice to the Architect within five days of receipt of the details. In case no notice is given to the Architect within five days, it will be assumed the details are reasonable development of the scale drawings. In case notice is given, the details will be considered and if found justified the Architect will either modify the drawings or shall recommend to OWNER a change order for any extra work involved.

E. All parts of the construction shall be of the best quality of their respective kinds and CONTRACTOR shall use all diligence to become fully involved in the required construction and finish, and in no case to proceed with the different parts of the Work without first obtaining from the Architect directions and/or drawings as may be necessary for proper performance of the Work.

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ARTICLE 14 SHOP DRAWINGS AND SUBMITTALS

A. The term "shop drawing" shall be understood to include, but not be limited to detail design calculations, fabrication and installation drawings, lists, graphs, and operating instructions.

B. CONTRACTOR shall check and verify all field measurements and shall promptly submit six copies of all shop or setting drawings, schedules, and material lists required for the work of various trades, checked and approved by CONTRACTOR.

C. All submittals of shop drawings, catalog cuts, data sheets, schedules, and material lists shall be complete and shall conform to contract drawings and specifications. Except where the preparation of a shop drawing is dependent upon the approval of a prior shop drawing, all shop drawings pertaining to the same class or portion of the work shall be submitted simultaneously.

D. Shop drawings shall be submitted at a time sufficiently early to allow review by the Architect and the Division of State Architect (DSA) if required, and to accommodate the rate of construction progress required under the Contract Documents. CONTRACTOR will be required to pay the Architect's reasonable and customary fees to expedite review of shop drawings which are not submitted in timely fashion.

E. Calculations of a structural nature must be approved by the DSA.

F. All shop drawing submittals shall be accompanied by an accurately completed transmittal form using the format provided by OWNER. Any shop drawing submittal not accompanied by the transmittal form, or where all applicable items on the form are not completed, will be returned for resubmittal. CONTRACTOR may authorize a material or equipment supplier to deal directly with the Architect with regard to shop drawings, however ultimate responsibility for the accuracy and completeness of the information contained in the submittal shall remain with CONTRACTOR.

G. Normally, a separate transmittal form shall be used for each specific item or class of material or equipment for which a submittal is required. Transmittal of shop drawings on various items using a single transmittal form will be permitted only when the items taken together constitute a manufacturer's "package" or are so functionally related that expediency indicates review of the group or package as a whole. At its option, CONTRACTOR or suppliers may obtain quantities of the shop drawing transmittal form at reproduction cost from the Architect.

H. CONTRACTOR's review and approval of shop drawings shall include the following stamp:

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"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. This shop drawing has been coordinated with all other shop drawings received to date by CONTRACTOR and this duty of coordination has not been delegated to subcontractors, material suppliers, the Architect, or the engineers on this Project.

Signature of CONTRACTOR"

I. The Architect's review of shop drawings will be limited to checking for general agreement with the Contract Documents, and shall in no way relieve CONTRACTOR of responsibility for errors or omissions contained in them, nor shall the review operate to waive or modify any provision contained in the Contract Documents. The Architect's approval of the drawings or schedules shall not relieve CONTRACTOR of its responsibility for deviations from drawings or specifications unless CONTRACTOR has called the Architect's attention to the deviations, in writing, at the time of submission, and secured the Architect's written approval.

J. Fabricating dimensions, quantities of material, applicable code requirements, and other contract requirements shall be CONTRACTOR's responsibility.

K. Within 21 calendar days after receipt of shop drawings, the Architect will return one or more prints of each drawing to CONTRACTOR with the Architect's comments noted on them.

L. If prints of the shop drawings are returned to CONTRACTOR marked "NO EXCEPTIONS TAKEN," formal revision of the drawings will not be required. If prints of the shop drawings are returned to CONTRACTOR marked "MAKE CORRECTIONS NOTED," formal resubmittal of the drawings will not be required. If prints of the shop drawings are returned to CONTRACTOR marked "REVISE AND RESUBMIT," CONTRACTOR shall revise the drawings and resubmit six copies of the revised drawings to the Architect. If prints of the shop drawings are returned to CONTRACTOR shall resubmit six new copies of the drawings to the Architect.

M. CONTRACTOR shall make a complete and acceptable submittal to the Architect by the second submission of drawings. OWNER shall withhold funds due to CONTRACTOR to cover additional costs of the Architect's review beyond the second submission and any other costs incurred by OWNER.

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N. Fabrication of an item shall not be commenced before the Architect has reviewed the pertinent shop drawings and returned copies to CONTRACTOR marked "NO EXCEPTIONS TAKEN," or "MAKE CORRECTIONS NOTED." Revisions indicated on shop drawings shall be considered changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis of claims for extra work.

O. No work represented by required shop drawings shall be purchased or commenced until the applicable submittal has been approved. The work shall conform to the approved shop drawings and all other requirements of the Contract Documents. CONTRACTOR shall not proceed with any related work which may be affected by the work covered under shop drawings until the applicable shop drawings have been approved, particularly where piping, machinery, equipment, and/or the required arrangements and clearances are involved.

P. CONTRACTOR SHALL HAVE NO CLAIM FOR DAMAGES OR EXTENSION OF TIME DUE TO ANY DELAY RESULTING FROM CONTRACTOR HAVING TO MAKE REQUIRED REVISIONS TO SHOP DRAWINGS UNLESS THE ARCHITECT'S REVIEW OF THE DRAWINGS IS DELAYED BEYOND THE TIME PROVIDED IN THE CONTRACT DOCUMENTS AND CONTRACTOR CAN ESTABLISH THAT THE ARCHITECT'S DELAY IN REVIEW ACTUALLY RESULTED IN A DELAY IN CONTRACTOR'S CONSTRUCTION SCHEDULE. CONTRACTOR SHALL NOT BE ENTITLED TO ANY CLAIM FOR DAMAGES RESULTING FROM DSA REVIEW EXTENDING BEYOND 15 CALENDAR DAYS AFTER SUBMITTAL. HOWEVER, OWNER MAY CONSIDER AN EXTENSION OF TIME DUE TO ANY DELAY CAUSED BY DSA REVIEW.

ARTICLE 15 SAMPLES

A. Within 35 calendar days following award of contract, or a shorter time as circumstances require, CONTRACTOR shall furnish for approval all samples required in the Specifications, together with catalogs and supporting data required by the Architect. This provision shall not authorize any extension of time for performance of the work. The Architect shall review the samples, as to conformance with design concept of work and compliance with information given in the Contract Documents, and approve or disapprove them within 10 working days from receipt.

B. Unless specified otherwise, sampling, preparation of samples, and tests shall be in accordance with the latest standards of the American Society for Testing and Materials.
C. Upon demand of the Architect or OWNER, designated samples shall be submitted or tests or examinations and considered before incorporation into the Work.
CONTRACTOR shall be solely responsible for delays due to samples not being submitted in time to allow for tests. Acceptance or rejection will be expressed in writing. Work shall

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be equal to approved samples in every respect. Samples which are of value after testing will remain the property of CONTRACTOR.

D. Work commenced before approval of samples subject to tests or examinations shall be at the sole risk of CONTRACTOR. CONTRACTOR alone shall bear the entire cost of repair, removal, or replacement of work commenced prior to approval of samples subject to tests or examinations.

ARTICLE 16 WORK TO COMPLY WITH APPLICABLE LAWS AND REGULATIONS

A. CONTRACTOR shall give all notices and comply with all laws, ordinances, rules, and regulations relating to the Work required by the Contract Documents.

B. If CONTRACTOR observes that the Drawings and/or Specifications are at variance with any applicable law, ordinance, rule, or regulation, CONTRACTOR shall promptly notify the Architect in writing, and any changes deemed necessary by the Architect shall be made as provided in the Contract Documents for changes in work. If CONTRACTOR performs any work which CONTRACTOR knows, or through the exercise of reasonable care should have known, to be contrary to any laws, ordinances, rules, or regulations, and fails to notify the Architect, CONTRACTOR shall bear all arising costs, including without limitation the costs of correction without increase or adjustment to the contract price or the time for performance. Where Plans, Drawings, or Specifications state that materials, processes, or procedures must be approved by the DSA, State Fire Marshall, or other body or agency, CONTRACTOR shall be responsible for satisfying the requirements of those bodies or agencies.

ARTICLE 17 WORK AND MATERIALS

A. Except as otherwise specifically stated in the Contract Documents, CONTRACTOR shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of every kind, and all other services and facilities necessary to perform and complete the Work within the time specified.

B. Unless otherwise specified, all materials shall be new and the best of their respective kinds and grades as noted or specified, and workmanship shall be of good quality.

C. Materials shall be furnished in ample quantities and at times to ensure uninterrupted progress of the work and shall be properly stored and protected. CONTRACTOR shall be solely responsible for any damage or loss by weather, theft, or other causes to materials or work under the Contract Documents. After issuance of the

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Notice to Proceed by OWNER, CONTRACTOR shall place orders for materials and/or equipment as specified so that delivery may be made without delays to the Work. Upon demand from the Architect, CONTRACTOR shall furnish to the Architect documentary evidence showing that orders have been placed.

D. In the event of failure to comply with the above instructions, OWNER reserves the right to place orders for any materials and/or equipment as it may deem advisable in order that the Work may be completed at the date specified in the Contract Documents, and all expenses incidental to procuring the materials and/or equipment shall be paid for by CONTRACTOR.

No material, supplies, or equipment for work under the Contract Documents shall Ε. be purchased subject to any chattel mortgage or under a conditional sale or other agreement by which an interest in all or any part is retained by the seller or supplier. CONTRACTOR warrants good title to all material, supplies, and equipment installed or incorporated in the Work, and upon completion of all work agrees to surrender the premises to OWNER, together with all improvements and appurtenances constructed or placed by CONTRACTOR, free from any claims, liens, or charges. CONTRACTOR further agrees that neither CONTRACTOR nor any person, firm, or corporation furnishing any materials or labor for any work covered by the Contract Documents shall have any right to a lien upon the premises or any improvement or appurtenance, except that CONTRACTOR may install metering devices or other equipment of utility companies or political subdivisions, title to which is commonly retained by the utility company or political In the event of the installation of any metering device or equipment, subdivision. CONTRACTOR shall advise OWNER as to its owner. Nothing contained in this article however shall defeat or impair the legal right of persons furnishing material or labor to look to funds due and owing CONTRACTOR for payment. This provision shall be inserted in all subcontracts and material contracts and notice of its provisions shall be given to all persons furnishing material for work when no formal contract is entered into for such material.

F. Title to new materials and/or equipment, and attendant liability for their protection and safety, shall remain in CONTRACTOR until incorporated in the Work and accepted by OWNER. No part of these materials and/or equipment shall be removed from their place of storage except for immediate installation in the Work, and CONTRACTOR shall keep an accurate inventory of all materials and/or equipment in a manner satisfactory to OWNER or its authorized representative.

G. Price, fitness, and quality being equal with regard to supplies, OWNER may prefer supplies grown, manufactured, or produced in California. OWNER may next prefer supplies partially manufactured, grown, or produced in California provided the bids of suppliers or the prices quoted by them do not exceed by more than five percent the lowest

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bids/prices quoted by out-of-state suppliers, the major portion of the manufacture of the supplies is not done outside of California, and the public good will be served. (Government Code Sections 4330-4334)

ARTICLE 18 CONTRACTOR'S SUPERVISION, PROSECUTION, AND PROGRESS

A. Unless personally present on premises where the work is being done, CONTRACTOR shall maintain competent project supervision at all times during working hours, which includes but is not limited to a Project Manager and all additional personnel necessary to maintain progress of the Project within the approved contract schedule satisfactory to the Architect. The Project Manager shall not be changed except with the written consent of the Architect. The Project Manager shall represent CONTRACTOR in its absence and all directions given to the Project Manager shall be binding on CONTRACTOR.

B. Unless personally present on premises where the work is being done, CONTRACTOR shall maintain a competent Superintendent on the work site at all times, satisfactory to the Architect. The Superintendent shall not be changed except with the written consent of the Architect. The Superintendent shall represent CONTRACTOR in its absence and all directions given to the Superintendent shall be binding on CONTRACTOR.

C. Before commencing the Work, CONTRACTOR shall give written notice to OWNER and the Architect of the name, qualifications, and experience of CONTRACTOR's proposed Project Manager and Superintendent. If either the Project Manager or Superintendent is found unsatisfactory by OWNER, CONTRACTOR shall replace that person with one acceptable to the OWNER.

D. CONTRACTOR shall supervise and direct the work competently and efficiently, devoting such attention and applying such skills as may be necessary to perform the Work in accordance with the Contract Documents.

E. Before commencing the Work, CONTRACTOR shall verify all grade lines, levels, and dimensions indicated on the Drawings and shall report any apparent error or inconsistencies to the Architect before commencing work. CONTRACTOR shall not proceed until reported apparent errors and inconsistencies are corrected or otherwise resolved by the Architect and OWNER.

F. CONTRACTOR shall establish and maintain all construction grades, lines, and bench marks, and be responsible for their accuracy and protection.

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G. CONTRACTOR represents itself to OWNER as a skilled, knowledgeable, and experienced CONTRACTOR who will or has carefully studied and compared the Contract Documents with each other, and CONTRACTOR further represents it has or shall at once report to the Architect any errors, inconsistencies, or omissions discovered in them. CONTRACTOR shall be liable to OWNER for damage resulting from errors, inconsistencies, or omissions in the Contract Documents that CONTRACTOR either:

1. Recognized and knowingly failed to report; or

2. Should have recognized, and which a similarly skilled, knowledgeable, and experienced contractor would have discovered, which CONTRACTOR negligently failed to recognize and report.

H. CONTRACTOR shall verify all indicated dimensions before ordering materials or equipment, or before performing work. CONTRACTOR shall take field measurements, verify field conditions, and carefully compare the field measurements and conditions and other information known to CONTRACTOR with the Contract Documents before commencing work. Errors, inconsistencies, or omissions discovered shall be reported to OWNER at once. Upon commencement of any item of work, CONTRACTOR shall be responsible for dimensions related to the item of work and shall make any corrections necessary to make work properly fit at no additional cost to OWNER. This responsibility for verification of dimensions is a non-delegable duty and may not be shifted to subcontractors or agents.

I. Omissions from the Plans, drawings, or Specifications, or the mis-description of details of work which are manifestly necessary to carry out the intent of the Plans, drawings, and Specifications, or which are customarily performed, shall not relieve CONTRACTOR from performing such omitted or mis-described work, but they shall be performed as if fully and correctly set forth and described in the Plans, drawings, and Specifications.

J. CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. CONTRACTOR shall be responsible to see that the finished work complies accurately and completely with the Contract Documents

ARTICLE 19 SUBSTITUTIONS

A. CONTRACTOR shall follow all instructions and requirements for substitutions set forth in the Instructions to Bidders and in this article.

B. OWNER desires that whenever possible all substitution requests be resolved prior to contract award. For that reason, no substitution requests, whether of "equal" materials,

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process, service, equipment, or otherwise, may be made after the bid date except by the express written permission of OWNER and on such terms as OWNER may require, or in the case of an emergency as where a specified material, process, service, equipment or other item has become unavailable through no fault of CONTRACTOR.

C. As to any emergency substitution request, CONTRACTOR shall timely submit the request, together with substantiating data, including substitution warranties, in order to prevent delays arising from the substitution request.

D. With respect to all proposed substitutions:

1. Every substitution request shall be on the substitution request form designated by OWNER, if any, and shall be accompanied by all substantiating data.

2. CONTRACTOR shall furnish with its substitution request all drawings, Specifications, samples, performance data, calculations, and other information as may be required to assist the Architect and OWNER in determining whether the proposed substitution is acceptable, including but not limited to the following:

- a. Identify product by Specifications section and article numbers; provide manufacturer's name and address, trade name of product, and model or catalog number; list fabricators and suppliers as appropriate.
- b. Attach product data as required by Specifications.
- c. List similar projects using product, dates of installation, and names of Architect/Engineer and owner.
- d. Give itemized comparison of proposed substitution with specified product, listing variations and reference to Specifications section and article numbers.
- e. Give quality and performance comparison between proposed substitution and specified product.
- f. Give cost data comparing proposed substitution with specified product and amount of net change to contract sum.
- g. Identify any required license fees or royalties.

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- h. List availability of maintenance services and replacement materials.
- i. State the effect of the substitution on the construction schedule, and the effect of any changes required in other work or products; include a document waiving rights to additional payment or time that may become necessary because of the failure of the substitution to perform adequately.

3. OWNER is not responsible for locating or securing any information which is not included in any substantiating data.

4. The proposed substitution must be, in the opinion of OWNER, substantially equal or better in every respect to what is specified. The burden of proof as to the quality or suitability of proposed substitutions shall be borne by CONTRACTOR.

5. With the assistance of the Architect, OWNER shall be the sole judge as to the quality and suitability of proposed substituted items, and decisions of the OWNER shall be final and conclusive.

6. All substitutions shall be submitted with a substitution warranty. Any substitution requests submitted without the warranty will not be considered, but will be returned to CONTRACTOR without review or evaluation. If required by OWNER, CONTRACTOR shall provide an extended warranty for the requested substitution.

7. No extension of time shall be granted if the extension request arises from a request for substitution, whether by reason of delay in making the request, delay in OWNER's approval of the request, delay in obtaining other governmental approvals, delay in coordination of substitutions into or with other work or equipment, delay in obtaining the substituted items, increased time of installation or performance, or for any other reason.

8. Once any part or all of a substitution request has been denied, it is considered always denied.

9. A substitution request shall be submitted separately from any other submittal and shall be clearly marked as a "request for substitution."

10. If the substitution is accepted, CONTRACTOR shall bear all costs and be solely and directly responsible for fitting accepted substitute materials and equipment into the available space in a manner acceptable to the Architect and OWNER, and for the proper operation of the substituted equipment with other

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equipment with which it may be associated. In addition, CONTRACTOR shall acknowledge in writing on CONTRACTOR's letterhead, that CONTRACTOR accepts complete responsibility for additional costs required for modifications to building or other materials and equipment and additional coordination of work.

11. Any additional time, including Architect review time, and any additional coordination, inspection, materials, equipment, labor, tools, warranty extension, or other items necessary to either accomplish a substitution or arising as a result of a substitution request will be the sole responsibility of and at the sole expense of CONTRACTOR, who will reimburse OWNER for review or redesign services associated with approval by the Architect and obtaining all required approvals by other agencies.

12. CONTRACTOR shall also be responsible for meeting all code requirements whether local, city, county, state, federal, or other.

F. If the substitution requested by CONTRACTOR is not substantially equal or better in every respect to that specified, in the opinion of DISTRCT, CONTRACTOR shall provide and/or perform as specified.

G. In the event CONTRACTOR furnishes a material, process, service, or equipment more expensive than that specified, the difference in cost of such material, process, service, or equipment furnished shall be borne by CONTRACTOR. Any difference in cost between an approved substitution which is lower in cost than the originally specified item shall be refunded by CONTRACTOR to OWNER.

H. Any engineering, design, or approval agencies' fees required to make adjustments in material or work of all trades directly or indirectly affected by the approved substitution shall be borne entirely by CONTRACTOR. If a substitution is approved, any additional time required to obtain shop drawings, order materials, make modifications, perform testing, or whatever else is necessary to make the substitution function properly in place of the originally specified item shall be borne solely by CONTRACTOR. It will also be CONTRACTOR's responsibility to acquire and install the substituted item in the time frame allowed under the Contract Documents. No time extension need be granted to CONTRACTOR for any substitution, except as OWNER in its sole discretion may deem appropriate.

ARTICLE 20 PROTECTION OF WORK AND PROPERTY

A. CONTRACTOR shall be responsible for all damages to persons or property which occur as a result of CONTRACTOR's fault or negligence in connection with performance under the Contract Documents, and for the proper care and protection of all materials

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delivered and work performed until completion and final acceptance by OWNER. With the exception of damage to the Work caused by "acts of God," as defined in Public Contract Code 7105, CONTRACTOR assumes the risk for damage or destruction of any or all work performed under the Contract Documents. CONTRACTOR shall adequately protect adjacent property from settlement or loss of lateral support as provided by law and this article.

Β. CONTRACTOR shall take, and require subcontractors to take, all necessary precautions for safety of workers and shall comply with all applicable federal, state, local, and other safety laws, standards, orders, rules, regulations, and building codes to prevent accidents or injury to persons on, about, or adjacent to the work site and to provide a safe and healthful place of employment. CONTRACTOR shall furnish, erect, and properly maintain at all times, as directed by OWNER or the Architect, or required by conditions and progress of work, all necessary safety devices, safeguards, construction canopies, signs, audible devices for protection of the blind, safety rails, belts and nets, barriers, lights, and watchmen for protection of workers and the public, and shall post danger signs warning against hazards created by such features in the course of construction. CONTRACTOR shall designate a responsible employee whose duty shall be to post information regarding protection and obligations of workers and other notices required under occupational safety and health laws, to comply with reporting and other occupational safety requirements, and to protect the life, safety, and health of workers. The name and position of the person so designated shall be reported in writing to OWNER by CONTRACTOR. CONTRACTOR shall correct any violation of safety laws, standards, orders, rules, or regulations. Upon issuance of a citation or notice of violation by the California Division of Occupational Safety and Health, the violation shall be corrected immediately by CONTRACTOR at CONTRACTOR's expense.

C. In an emergency affecting safety of life, work, or adjoining property, CONTRACTOR is permitted to act at its discretion without special instruction or authorization from the Architect or OWNER to prevent any threatened loss or injury, and CONTRACTOR shall act if authorized or instructed by the Architect or OWNER. Any compensation claimed by CONTRACTOR for emergency work shall be determined according to the Contract Documents.

D. CONTRACTOR shall (unless waived by OWNER in writing):

1. Provide heat, covering, and enclosures necessary to protect all work, materials, equipment, appliances, and tools against damage by weather conditions;

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2. Take adequate precautions to protect existing sidewalks, curbs, pavements, utilities, adjoining property, and structures, and avoid damage to them, and repair any damage caused by construction operations;

3. When performing new construction on existing sites, become informed and take into specific account the maturity of the students on the site, and perform work which may interfere with school routine before or after school hours; enclose the work area with a substantial barricade and arrange work to cause a minimum of inconvenience and danger to students and staff in their regular school activities;

4. Provide substantial barricades around any shrubs or trees to be preserved;

5. Deliver materials to the building area over the route designated by the Architect;

6. Take preventative measures to eliminate excessive dust;

7. Confine apparatus, storage of materials, and the operations of its workers within limits indicated by law, ordinances, permits, or directions of the Architect and not unreasonably encumber the premises with materials;

8. Enforce all instructions of OWNER and the Architect regarding signs, advertising, fires, danger signals, barricades, and smoking, and require that all persons employed on the Work comply with all regulations while on the construction site;

9. Exercise reasonable care to prevent disturbing or covering any survey markers, monuments, or other devices marking property boundaries or corners; if markers are disturbed, they shall be replaced by an approved civil engineer at no cost to OWNER.

ARTICLE 21 USE OF ASBESTOS OR LEAD MATERIALS/PRODUCTS

A. CONTRACTOR shall not use any asbestos or lead containing products or materials in performing the work under the Contract Documents. Upon completion of the Project, CONTRACTOR shall certify in writing to OWNER that no asbestos or lead containing materials or products were used by CONTRACTOR or any subcontractor in performing the work required by the Contract Documents.

B. Should asbestos containing materials be installed by CONTRACTOR in violation of this certification, or if removal of asbestos containing materials is otherwise a part of the Project, decontaminations and removals will meet the following criteria:

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1. Decontamination and removal of work found to contain asbestos or work installed with asbestos containing equipment shall be done only under the supervision of a qualified consultant, knowledgeable in the field of asbestos abatement and accredited by Cal-OSHA.

2. Any asbestos removal contractor shall be a Cal-OSHA accredited contractor qualified in the removal of asbestos and shall be chosen and approved by the asbestos consultant who shall have sole discretion and final determination in this matter.

3. The asbestos consultant shall be chosen and approved by OWNER who shall have sole discretion and final determination in this matter.

4. The work will not be accepted until asbestos contamination is reduced to levels deemed acceptable by the asbestos consultant.

C. Cost of all asbestos removal, including but not limited to the cost of an asbestos removal contractor, the cost of the asbestos consultant, analytical and laboratory fees, time delays, and additional costs as may be incurred by OWNER shall be borne entirely by CONTRACTOR.

D. Interface of work for the Project with work containing asbestos shall be executed by CONTRACTOR at CONTRACTOR's risk and at CONTRACTOR's discretion with full knowledge of the currently accepted standards, hazards, risks, and liabilities associated with asbestos work and asbestos containing materials. By execution of the Construction Agreement, CONTRACTOR acknowledges the above and agrees to hold harmless OWNER, its governing board, or other governing body, employees, agents, and the Architect and assigns for all asbestos liability which may be associated with this work. CONTRACTOR further agrees to instruct CONTRACTOR's employees with respect to the above standards, hazards, risks, and liabilities.

E. Should lead containing materials be installed by CONTRACTOR in violation of this certification, or if removal of lead containing materials is part of the Project, decontaminations and removals will meet the criteria approved by OWNER.

F. The cost of all removals or decontaminations resulting from the installation of materials in violation of this certification shall be at the sole expense of CONTRACTOR.

ARTICLE 22 LAYOUT AND FIELD ENGINEERING

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ARTICLE 23 UTILITIES

A. All utilities, including but not limited to electricity, water, gas, and telephone used on the Work, shall be furnished and paid for by CONTRACTOR. CONTRACTOR shall furnish and install necessary temporary distribution systems, including meters if necessary, from distribution points to points on the site where the utility is necessary to perform the work. Upon completion of the Work, CONTRACTOR shall remove all temporary distribution systems.

B. If this Project is for an addition to an existing facility, CONTRACTOR may use existing OWNER utilities, with the written permission of OWNER, by making prearranged payments to OWNER for utilities used by CONTRACTOR for construction.

ARTICLE 24 UTILITIES: REMOVAL, RESTORATION

A. Pursuant to Government Code section 4215, OWNER assumes the responsibility for removal, relocation, and protection of utilities located on the construction site at the time of commencement of construction with respect to any main or trunkline utility facilities which are not identified in the Plans and Specifications. CONTRACTOR shall not be assessed any delay in completion of the Project caused by OWNER's failure to provide for removal or relocation of utility facilities. OWNER shall compensate CONTRACTOR for the costs of locating, repairing damage not due to CONTRACTOR's failure to exercise reasonable care, and removing or relocating any utility facilities not indicated in the Plans and Specifications with reasonable accuracy, and for equipment necessarily idle during the work, using the provisions of the Contract Documents on changes in the Work.

B. This article shall not be construed to preclude assessment against CONTRACTOR for any other delays in completion of the Work. Nothing in this article shall be deemed to require OWNER to indicate the presence of existing service laterals or appurtenances whenever the presence of those utilities on the construction site can be inferred from the presence of other visible facilities, such as buildings or meter junction boxes on or adjacent to the construction site.

C. If while performing work under the Contract Documents, CONTRACTOR discovers utility facilities not identified by OWNER in the contract Plans or Specifications, CONTRACTOR shall immediately notify OWNER and the utility in writing.

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D. As part of the work to be performed, CONTRACTOR shall provide the notices and proceed in accordance with Government Code Sections 4216.2, 4216.3, and 4216.4, and pay all fees charged pursuant to Government Code Section 4216, et seq.

ARTICLE 25 SANITARY FACILITIES

CONTRACTOR shall provide temporary sanitary toilet facilities as required by law and additional facilities as directed by the Project Inspector for the use of all workers. The facilities shall be maintained in a sanitary condition and left at the site until removal is directed by the Project Inspector. Use of toilet facilities contained in the Work under construction shall not be permitted except with the approval of the Project Inspector.

ARTICLE 26 LABOR—FIRST AID

CONTRACTOR shall maintain emergency first aid treatment on the Project for all workers of CONTRACTOR or any subcontractors on the Project, and shall ensure compliance with the Federal Occupational Safety and Health Act of 1970 (29 U.S.C.A., Section 651 et seq.).

ARTICLE 27 CHANGES AND EXTRA WORK

A. As used in this article, the following definitions shall apply:

1. "Labor" means any amount(s) paid directly to non-supervisory workers (up to and including general foreman) in the form of employee wages and benefits in order to perform the Work. These costs shall include documented payroll cost (wages, payroll taxes, fringe benefits, workers compensation) and general liability insurance as submitted and approved by OWNER.

2. "Material" means all products, equipment, and devices that are physically incorporated into the work to be performed. Any costs or equipment, facilities, or services not physically incorporated in the work to be performed but necessary for its completion shall be considered "overhead." Cash or trade discounts available to the purchaser shall be credited to OWNER. Material costs secured by other than direct purchase and billing will be the price paid to the actual supplier as determined by OWNER. Markup will not be allowed. If cost of materials is deemed excessive, the price will be determined to be the lowest current wholesale price delivered to the site, less cash or trade discount.

3. "Equipment" costs shall include transportation and setup costs, if CONTRACTOR can substantiate that the Work could not have been performed

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economically with equipment already at the site. Rental costs shall not exceed rates set forth in the then-current "Rental Rate Blue Book," published by Dataquest, Inc., Palo Alto, California, as adjusted to this region. Owned equipment costs shall not exceed rates set forth in the then-current "Cost Reference Guide for Construction Equipment," published by Dataquest. Hours of usage must be documented by CONTRACTOR in order to be the basis for equipment utilization charges for Change Orders. CONTRACTOR will not be allowed to charge for idle equipment.

4. "Overhead" means any necessary costs and expenses incurred in the performance of the Work excluding "labor," "materials," and "equipment" as defined above.

B. Without invalidating the Contract Documents, OWNER may order extra work or make changes by altering, adding to, or deducting from the Work, and the contract sum shall be adjusted accordingly. All the work shall be subject to the conditions of the Contract Documents, except that any claim for extension of time caused by changes shall be adjusted at the time of ordering the change, with adjustments to time being made after CONTRACTOR has justified, through documentation, the impact on the critical path of the Project.

C. In giving instructions, the Architect shall have authority to make minor changes in the Work not involving a change in cost and not inconsistent with purposes of the Project, subject to DSA approval. If so authorized by OWNER, OWNER's Representative, if one has been identified, may authorize changes in work involving a change in cost that does not exceed \$15,000. Otherwise, except in an emergency endangering life or property, no extra work or change shall be performed unless pursuant to a written order from OWNER, and no claim for any addition to the contract amount or time shall be valid unless by written order of OWNER. A Change Order will not be officially approved until ratified by OWNER's Board of Trustees or other governing body.

D. If the Architect determines that the work required to be done constitutes extra work outside the scope of the Contract Documents, the Architect shall send a request for a detailed proposal to CONTRACTOR. CONTRACTOR will respond with a detailed proposal within five calendar days of receipt of the request for proposal. If the work is to be performed by a subcontractor, CONTRACTOR's proposal must include a bid from the subcontractor.

E. If the Architect determines the work required does not constitute extra work, or work for which CONTRACTOR may recover additional compensation, the Architect shall so notify CONTRACTOR. If CONTRACTOR is not in agreement with the determination by the Architect, CONTRACTOR shall immediately give notice of any claim as provided

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in the Contract Documents. CONTRACTOR shall perform the required work in timely fashion.

F. At the discretion of OWNER, the value of any extra work, change, or deduction shall be determined in one or more of the following ways:

1. By acceptable lump sum proposal from CONTRACTOR, a total sum for the changed work may be mutually determined by OWNER and CONTRACTOR. CONTRACTOR shall furnish a breakdown of the proposed lump sum cost satisfactory to OWNER, which shall be full and final compensation for the change, including time adjustment.

2. By contract unit prices contained in CONTRACTOR's original bid and incorporated in the Contract Documents, or fixed by subsequent agreement between OWNER and CONTRACTOR. Where payment for Change Orders is based on unit prices stipulated in CONTRACTOR's bid, those unit prices shall constitute the total equitable adjustment due for the change. If a change is ordered in an item or work covered by a contract unit price, and the change does not involve a substantial change in the character of the work from that shown on the Plans or included in the Specifications, an adjustment in payment will be made based upon the increase or decrease in quantity and the contract unit price. In the case of such an increase or decrease in a major bid Item, the use of this basis for the adjustment of payment will be limited to that portion of the change which, together with all previous changes to that item, is not in excess of 25 percent of the total cost of such item based on the original quantity and contract unit price. If a change is ordered in an item of work covered by a contract unit price, and the change does involve a substantial change in the character of the work from that shown on the Plans or included in Specifications, an adjustment in payment will be made in accordance with other sections of this article. Should any contract item be deleted in its entirety, payment will be made only for actual costs incurred prior to notification of such deletion.

3. Stipulated contract unit prices are those established by OWNER in the Contract Documents, as distinguished from contract unit prices submitted by CONTRACTOR, and may be used for the adjustment of contract changes. Whether set forth in the Contract Documents or subsequently agreed upon, all contract unit prices shall include overhead, profit, and increased premium on the Surety Bonds.

4. By cost of labor, material, equipment, and subcontract, plus a percentage for overhead and profit. If the value is determined by this method the following requirements shall apply:

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a. Daily reports by CONTRACTOR, as follows:

(i) <u>General</u>. At the close of each working day, CONTRACTOR shall submit a daily report to the Architect and the Project Inspector on forms approved by OWNER, together with applicable delivery tickets listing all labor, materials, and equipment involved for that day, 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 Architect and 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 CONTRACTOR.

(ii) <u>Labor</u>. The report shall show names of workers, classifications, and hours worked and hourly rate. Project supervision expenses, including for foremen and above, are not allowed.

(iii) <u>Materials</u>. The report shall describe and list quantities of materials used and unit cost.

(iv) <u>Equipment</u>. The report shall show the type of equipment, size, identification number, and hours of operation, including loading and transportation, if applicable, and hourly/daily costs.

(v) <u>Other Services and Expenditures</u>. Other services and expenditures shall be described in such detail as OWNER may require.

b. Basis for Establishing Costs

(i) <u>Labor</u>. The costs of labor will be the actual cost for wages prevailing locally for each craft classification or type of worker 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 labor classifications which would increase the extra work cost will not be permitted unless CONTRACTOR establishes the necessity for such additional costs. Labor costs for equipment operators and helpers shall be reported

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(ii) <u>Materials</u>. The cost of materials reported shall be at invoice or lowest current price at which such materials are locally available and delivered to the work site in the quantities involved, plus sales tax, freight, and delivery. OWNER reserves the right to approve materials and sources of supply, or to supply materials to CONTRACTOR if necessary for the progress of the work. No markup shall be applied to any material provided by OWNER.

(iii) Tool and Equipment Rental. No payment will be made for the use of tools which have a replacement value of \$100 or less or where an invoice is not provided. Regardless of ownership, the rates to be used in determining equipment rental costs shall not exceed listed rates prevailing locally at equipment rental sources 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 OWNER than holding it at the work site, it shall be returned, unless CONTRACTOR elects to keep it at the work site at no expense to OWNER. All equipment shall be acceptable to the Architect in good working condition, and suitable for the purpose for which it is to be used. Manufacturer's ratings and manufacturer's approved modifications shall be used to classify equipment and it shall be powered by a unit of at least the minimum rating recommended by the manufacturer.

(iv) <u>Other Items</u>. OWNER may authorize other items which may be required on the extra work. These 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 CONTRACTOR or any of the Subcontractors. Detailed invoices covering all such items shall be submitted with the request for payment.

(v) <u>Invoices</u>. Vendors' invoices for material, equipment rental, and other expenditures shall be submitted with the request for payment.

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If the request for payment is not substantiated by invoices or other documentation, OWNER may establish the cost of the item involved at the lowest price which was current at the time of the report.

c. The following form shall be used by OWNER and CONTRACTOR as applicable to communicate proposed additions and deductions to the Contract Documents.

EXTRA CREDIT

(i) Material (attached itemized quantity and unit cost plus sales tax

(ii) Labor (attached itemized hours and rates)

(iii) Subtotal

(iv) If Subcontractor performed work, add Subcontractor's overhead and profit to portions performed by it, not to exceed 10% of Item (iii) above

(v) Subtotal

(vi) CONTRACTOR's Overhead and Profit, including any increased bond costs, not to exceed 10% of Item (v)

(viii) Total

5. IT IS EXPRESSLY UNDERSTOOD THAT THE VALUE OF SUCH EXTRA WORK OR CHANGES AS DETERMINED BY ANY OF THESE METHODS EXPRESSLY INCLUDES ANY AND ALL OF CONTRACTOR'S COSTS AND EXPENSES, BOTH DIRECT AND INDIRECT, RESULTING FROM DELAYS OR ADDITIONAL TIME REQUIRED ON THE PROJECT, OR RESULTING FROM ACCELERATED WORK TO AVOID DELAYS TO THE PROJECT.

G. For changes that increase the contract price, CONTRACTOR may include amounts for overhead and profit. CONTRACTOR's overhead (general and administrative) and profit shall include, but not be limited to additional bond costs, additional job site facilities costs, additional home and field office costs, additional administrative costs, additional cleaning, and additional project supervision costs (which includes but is not limited to a Project Manager and any and all additional personnel necessary to maintain the project progress within the approved contract schedule).

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H. CONTRACTOR'S overhead, profit, and additional bond costs on the cost of work performed by CONTRACTOR shall be a total sum not exceeding 10 percent of the cost of work.

I. CONTRACTOR'S overhead, profit, and additional bond costs on the cost of work performed by Subcontractors of all tiers shall be a total sum not exceeding 10 percent of those costs.

J. Subcontractors' (all tiers) overhead and profit on the cost of work performed by Subcontractor shall be a total sum not exceeding 10 percent of the cost of labor, materials, rentals, etc.

K. Overhead and profit shall not be applied to taxes, delivery charges, and insurance by CONTRACTOR or its subcontractors or sub-subcontractors.

L. Before CONTRACTOR is authorized to proceed with extra work or changes on the basis set forth in this Article, OWNER and CONTRACTOR shall be in complete agreement on what the term "costs" shall include and the percentage amount of fixed fee CONTRACTOR is to charge.

M. If CONTRACTOR should claim that any instruction, request, drawing, specification, action, condition, omission, default, or other situation constitutes a change, extra work, or otherwise obligates OWNER to pay additional compensation to CONTRACTOR or to grant an extension of time, or constitutes a waiver of any provision in the Contract Documents, CONTRACTOR shall notify OWNER in writing of such claim within five calendar days from the date CONTRACTOR has actual or constructive notice of the factual basis supporting the claim. The notice shall state the factual basis for the claim and cite in detail the Contract Documents (including plans and specifications) upon which the claim is based. CONTRACTOR's failure to notify OWNER within the five-day period shall be deemed a waiver and relinquishment of such a claim. If the notice is given within the specified time, the procedure for its consideration shall be treated as a claim following the claims procedures in the Contract Documents.

N. Costs which shall not be paid in Change Orders under the Contract Documents include but are not limited to interest costs of any type, claim preparation or filing costs, costs in preparing or reviewing proposed change orders or proposals, CQR's, ASI's, etc., lost revenue, lost profit, lost income or earnings, rescheduling costs, costs of idled equipment, lost earnings or interest on unpaid retainage, claims consulting costs, costs of corporate officers or staff visiting the site, fluctuation of foreign currency conversion or exchange rate costs, or loss of other business.

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O. Notwithstanding any other provision in the Contract Documents, the adjustment in the contract price, if any, and the adjustment in the contract time, if any, set out in a change order shall constitute the entire compensation and/or adjustment in the contract time due CONTRACTOR arising out of the change in the work covered by the change order, including any extensions of time, unless otherwise expressly stated in the change order. The amount of any compensation due CONTRACTOR shall be calculated pursuant to this Article. The compensation shall <u>not</u> include any additional charges not set forth in this Article and shall not include delay damages due to processing a change order or refusal to sign a change order, or any indirect, consequential, or incidental costs, including any project management costs, extended home office and field office overhead, administrative costs, or profit except as such matters may be authorized under this Article.

P. In furtherance of the intent to settle all change orders fully and finally at the issuance date of the change order, the following shall be expressly incorporated in writing and deemed incorporated in all change orders:

THE COMPENSATION (TIME AND COST) SET FORTH IN THIS CHANGE ORDER COMPRISES THE TOTAL COMPENSATION DUE CONTRACTOR FOR THE CHANGE DEFINED IN THE CHANGE ORDER. INCLUDING IMPACT ON UNCHANGED WORK. ACCEPTANCE OF THIS CHANGE ORDER CONSTITUTES A FULL AND COMPLETE ACCORD AND SATISFACTION OF ANY AND ALL CLAIMS BY CONTRACTOR ARISING OUT OF OR RELATING TO THE CHANGE ORDER, INCLUDING BUT NOT LIMITED TO CLAIMS FOR CONTRACT BALANCE AND RETENTION, TIME, EXTENDED FIELD OR HOME OFFICE. OR OTHER OVERHEAD. ALL ACCELERATION. IMPACT. DISRUPTION AND DELAY DAMAGES, ANY AND ALL OTHER DIRECT AND/OR INDIRECT COSTS. CLAIMS BY SUBCONTRACTORS AND SUPPLIERS, AND ANY AND ALL OTHER CLAIMS AGAINST OWNER FOR TIME OR MONEY, FROM ANY SOURCE AND UNDER ANY LEGAL THEORY WHATSOEVER, AS TO THE SUBJECT OF THIS CHANGE ORDER. NO SIGNATURE UNDER PROTEST OR ACCOMPANIED BY RESERVATION OF RIGHTS OR PROTEST LANGUAGE, OR ANY OTHER ATTEMPTS TO AVOID SUCH WAIVER SHALL BE OF ANY FORCE OR EFFECT WHATSOEVER. NO ADDITIONS OR DELETIONS TO THIS CHANGE ORDER SHALL BE ALLOWED. EXCEPT WITH WRITTEN PERMISSION OF OWNER.

Q. Within 10 days of the notice to proceed, CONTRACTOR shall submit a detailed list of the field office overhead cost components which are time related and which represent costs incurred as a direct result of time extensions. No allowance for overhead costs and no profit allowance will be allowed on the extended daily field overhead cost

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component of the change Order. The deviation of an extended home office overhead rate and its application to contract time extensions shall not be allowed.

ARTICLE 28 CORRECTION OF WORK BEFORE FINAL PAYMENT

A. CONTRACTOR shall promptly remove from the premises all work identified by OWNER as failing to conform to the Contract Documents, whether incorporated or not. CONTRACTOR shall promptly replace and repair its own work to comply with the Contract Documents, without additional expense to OWNER, and shall bear the expense of making good all work of other contractors destroyed or damaged by that removal or replacement, including compensation for the Architect's additional services.

B. If CONTRACTOR does not remove work within a reasonable time following written notification, OWNER may remove and store the material at CONTRACTOR'S expense. If CONTRACTOR does not pay the expenses of removal within 10 days, OWNER may sell the materials at auction or private sale upon 10 days' written notice, and shall account for any net proceeds after deducting all costs and expenses that should have been borne by CONTRACTOR.

ARTICLE 29 DEDUCTIONS FOR UNCORRECTED WORK

A. If CONTRACTOR defaults or neglects to carry out the Work in accordance with the Contract Documents, or fails to perform any provision of the Contract Documents, after 10 days' written notice to CONTRACTOR, OWNER may make good such deficiencies without prejudice to any other remedy it may have.

B. OWNER shall reduce the total contract price by the cost of making good such deficiencies.

C. If OWNER deems it inexpedient to correct work not performed in compliance with the Contract Documents, an equitable deduction from the contract price shall be made.

ARTICLE 30 CLEANING UP

A. CONTRACTOR shall at all times keep the work site free from debris such as waste, rubbish, and excess materials and equipment caused by this Work. CONTRACTOR shall not leave debris under, in, or about the work site, but shall promptly remove all items.

B. Upon completion of the Work, CONTRACTOR shall clean the interior and exterior of each building, including fixtures, equipment, walls, floors, ceilings, roofs, window sills and ledges, horizontal projections, and any areas where debris has collected. CONTRACTOR shall clean and polish all glass, plumbing fixtures, and finish hardware

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and similar finish surfaces and equipment, and remove temporary fencing, barricades, planking, sanitary facilities, and similar temporary facilities from the site.

C. If CONTRACTOR fails to clean up at the completion of the Work, OWNER may do so and the cost for such cleanup shall be charged back to CONTRACTOR and may be deducted from future progress or final payments.

D. CONTRACTOR shall not include cleaning as an additional line item for change order payments. Cleaning is included in the overhead expenses included in the CONTRACTOR's and/or Subcontractor's overhead and profit percentage.

ARTICLE 31 ACCESS TO WORK

OWNER and its representatives shall at all times have access to the Work wherever it is in preparation or progress. CONTRACTOR shall provide safe and proper facilities for access so OWNER's representatives may perform their functions under the Contract Documents.

ARTICLE 32 GUARANTEE

A. CONTRACTOR warrants that the Work, including any equipment furnished by CONTRACTOR, shall be:

- 1. Free from defects in workmanship and material;
- 2. Free from defects in any design performed by CONTRACTOR;

3. New, and conform and perform to the requirements stated in the Specifications, and where detail requirements are not so stated, shall conform to applicable industry standards; and

4. Suitable for the use stated in the Specifications.

B. The warranty period for discovery of defective work shall commence on the date stamped on the Notice of Completion to verify recording with the County, and shall continue for the period set forth in the Specifications or for one year if not so specified. If during the warranty period the Work is not available for use due to defective work, such time of unavailability shall not be counted as part of the warranty period. The warranty period for corrected defective work shall continue for a duration equivalent to the original warranty period.

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C. OWNER shall give CONTRACTOR prompt written notice after discovery of any defective work. CONTRACTOR shall correct any such defective work, as well as any damage to any other part of the Work resulting from such defective work, and provide repair, replacement, or reimbursement, at its sole expense, in a manner approved by OWNER and with due diligence and dispatch as required to make the Work ready for use by OWNER, ordinary wear and tear, unusual abuse, or neglect excepted. Such corrections shall include but not be limited to any necessary adjustments, modifications, changes of design (unless of OWNER's design), removal, repair, replacement, or reinstallation, and shall include all necessary parts, materials, tools, equipment, transportation charges, and labor as may be necessary, and cost of removal. Replacement shall be performed at a time and in such a manner so as to minimize the disruption to OWNER's use of the Work.

D. In the event CONTRACTOR or Surety fails to commence and pursue with diligence any replacements or repairs within one week after being notified in writing, OWNER is authorized to proceed to have any defects repaired at the expense of CONTRACTOR and Surety, and CONTRACTOR and Surety agree to pay the costs and charges immediately on demand.

E. If defective work creates a dangerous condition, in the opinion of OWNER, or requires immediate correction or attention to prevent further loss to OWNER or to prevent interruption or operations of OWNER, OWNER shall attempt to give the notice required by this Article. If CONTRACTOR or Surety cannot be contacted or neither complies with OWNER's request for correction within a reasonable time, as determined by OWNER, without regard to the provisions of this Article, OWNER may proceed to make the correction or provide the attention, and the costs of correction or attention shall be charged against CONTRACTOR. Any action by OWNER shall not relieve CONTRACTOR of the guarantees provided in this Article or elsewhere in the Contract Documents.

F. This article does not in any way limit the guarantee on any items for which a longer guarantee is specified, or any items for which a manufacturer gives a guarantee for a longer period. CONTRACTOR shall furnish OWNER with all appropriate guarantee or warranty certificates upon completion of the Project.

G. All guarantees required under this Article shall be considered to be in writing on the guarantee provided by CONTRACTOR, and CONTRACTOR shall use the form included in the Contract Documents unless otherwise agreed by OWNER.

H. OWNER may collect its reasonable costs and attorneys' fees in any action to enforce this Article.

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ARTICLE 33 SURVEYS

OWNER shall furnish all surveys describing the physical characteristics, legal limitations, and utility locations for the site of the Project and a legal description of the site. Surveys to determine locations of construction, grading, and site work shall be provided by CONTRACTOR.

ARTICLE 34 SOILS INVESTIGATION REPORT

A. When a soils investigation report has been obtained from test holes at the site, that report is available for CONTRACTOR's use in preparing its bid and work under the Contract Documents. Any information obtained from the report or any information given on drawings as to subsurface soil conditions or as to elevations of existing grades or elevations of underlying rock, is approximate only, is not guaranteed, and **is not part of the Contract Documents**. CONTRACTOR is required to make a visual examination of the site and must make whatever tests it deems appropriate to determine the actual underground condition of the soil.

B. CONTRACTOR agrees that it will make no claim against OWNER for damages in the event that during progress of the Work, CONTRACTOR encounters subsurface or latent conditions at the site materially different from those shown on drawings or indicated in Specifications or soils reports, or for unknown conditions of an unusual nature which differ materially from those ordinarily encountered in work of the type provided for in the Plans and Specifications.

C. If during the course of work under the Contract Documents CONTRACTOR encounters subsurface or latent conditions which differ materially from those indicated in the soils investigation report, or drawings, or Specifications, CONTRACTOR shall notify OWNER of same within five working days of discovery of the condition.

WARNING: OWNER does not warrant the soils at the project site. A soils investigation report is provided for CONTRACTOR'S information only. CONTRACTOR represents it has conducted an independent investigation of the project site and the soil conditions of the site. CONTRACTOR is solely responsible to ascertain site conditions for the purposes of determining construction means and methods before commencing construction.

ARTICLE 35 PERMITS AND LICENSES

A. All necessary permits and licenses shall be secured and paid for by CONTRACTOR unless otherwise provided in the Contract Documents.

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B. All permits, licenses, and certificates shall be delivered to the Architect before demand is made for the certificate of final payment.

C. CONTRACTOR shall, and shall require subcontractors to, maintain appropriate contractor's licenses in effect as required by law throughout the entire Project.

D. Easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by OWNER unless otherwise specified.

E. Permits and charges for installation and inspection of utility services by serving utilities shall be secured and paid for by OWNER.

ARTICLE 36 CUTTING AND PATCHING

A. CONTRACTOR shall do all cutting, fitting, or patching of the Work as required to make its several component parts come together properly, and fit it to receive or be received by any work of other contractors indicated on, or reasonable implied by, the drawings and Specifications, and shall follow all directions given by the Architect.

B. Any cost caused by defective or ill-timed work shall be borne by CONTRACTOR.

C. CONTRACTOR shall not endanger any work by cutting, excavating, or otherwise altering work, and shall not cut or alter work of any other contractor except with the written consent of the Architect.

D. CONTRACTOR shall be solely responsible for protecting existing work on adjacent properties and shall obtain all required permits for shoring and excavations near property lines.

E. When modifying existing work or installing new work adjacent to existing work, CONTRACTOR shall match the finishes, textures, and colors of the original work as closely as conditions of site and materials will allow, refinishing existing work as required, at no additional cost to OWNER.

F. CONTRACTOR is aware that this Project may be split into several phases. If the Project is split into phases, CONTRACTOR has made allowances for any delays or damages which may arise from coordination with contractors for other phases. If any delays should arise from a contractor working on a different phase, CONTRACTOR's sole remedy for damages, including delay damages, shall be against the contractor who caused such damage and not against OWNER. CONTRACTOR shall provide access to contractors for other phases as necessary to prevent delays and damages to contractors working on other phases of construction.

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ARTICLE 37 TESTS AND INSPECTIONS

Α. If the Contract Documents, OWNER's instructions, laws, ordinances, or any public authority requires any work to be specially tested or approved, CONTRACTOR shall give notice, in accordance with requirements of such authority, of CONTRACTOR's readiness for observation or inspection. Such notice shall be given at least two working days prior to being tested or covered up. If inspection is by authority other than OWNER, CONTRACTOR shall inform OWNER's Inspector of the date fixed for such inspection. Required certificates of inspection shall be secured by CONTRACTOR. Observations by OWNER shall be promptly made, and where practicable, at the source of supply. If any work is covered up without approval or consent of OWNER, if required by OWNER, it must be uncovered for examination and satisfactorily reconstructed at CONTRACTOR's expense, in compliance with the Contract Documents. The cost of inspection or testing of any materials which are not in compliance with the Contract Documents shall be borne by CONTRACTOR. If the inspection or testing was paid for by OWNER, it will be charged back to and paid by CONTRACTOR. Other costs for tests and inspection of materials shall be paid by OWNER, unless otherwise provided in the Contract Documents.

B. Where the inspection and testing will be conducted by an independent laboratory or agency, the materials or samples of materials to be tested shall be selected by the laboratory or agency, or OWNER's representative, and not by CONTRACTOR.

C. CONTRACTOR shall notify OWNER in writing a sufficient time in advance of the manufacture of any materials to be supplied to CONTRACTOR under the Contract Documents, which materials must be tested according to the terms of the Contract Documents, in order that OWNER may arrange for testing at the source of supply. Materials shipped by CONTRACTOR from the source of supply without having satisfactorily passed testing and inspection, or prior to receipt of notice from OWNER that testing and inspection will not be required, shall not be incorporated into the Work without the prior approval of OWNER and subsequent testing and inspection.

D. Reexamination or retesting of questioned work may be ordered by OWNER, and if so ordered any work must be uncovered by CONTRACTOR. If the work is determined to be in accordance with the Contract Documents, OWNER shall bear the costs of reexamination or retesting and replacement. If the work is not in accordance with the Contract Documents, CONTRACTOR shall bear the costs.

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ARTICLE 38 EXCAVATION DEEPER THAN FOUR FEET

A. CONTRACTOR shall provide adequate sheeting, shoring, and bracing, or equivalent method, for the protection of life and limb in trenches and open excavation. Any such method used shall conform to applicable safety standards.

B. If the Contract Documents involve the excavation of any trench or trenches more than four feet in depth, in advance of excavation CONTRACTOR shall submit to OWNER, or to whomever OWNER designates, a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of any trench or trenches. If the plan varies from the Shoring System Standards established by the Construction Safety Orders of the Division of Industrial Safety of the Department of Industrial Relations, the plan shall be prepared by a registered civil or structural engineer employed by CONTRACTOR, and all costs of the plan shall be included in the contract price. In no case shall the plan be less effective than that required by the Construction Safety Orders. No excavation of any trench or trenches shall be commenced until the plan has been accepted by CAL-OSHA and a CAL-OSHA permit for the plan is delivered to OWNER.

C. If the Contract Documents involve digging trenches or excavations that extend deeper than four feet below the surface, the following shall apply:

1. Before the following conditions are disturbed, CONTRACTOR shall promptly notify OWNER in writing of any:

a. Material that CONTRACTOR believes may be hazardous waste, as defined in Health and Safety Code Section 25117, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law.

b. Subsurface or latent physical conditions at the site different from those indicated.

c. 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 Documents.

2. OWNER shall promptly investigate the conditions, and if it finds that the conditions do so materially differ, or do involve hazardous waste, and cause a decrease or increase in CONTRACTOR's cost or the time required for

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performance of any part of the Work, shall issue a change order under the procedures described in the Contract Documents.

3. In the event of a dispute between OWNER and CONTRACTOR concerning whether or not the conditions materially differ or involve hazardous waste, or cause a decrease or increase in CONTRACTOR's cost or time required for performance of any part of the Work, CONTRACTOR shall not be excused from any scheduled completion date provided for by the Contract Documents, but shall proceed with all the work to be performed. 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.

ARTICLE 39 WORKERS

A. At all times, CONTRACTOR shall enforce strict discipline and good order among its employees, shall not employ any unfit person or anyone not skilled in the work assigned, and shall require the same of all subcontractors of all tiers. It shall be the responsibility of CONTRACTOR to ensure subcontractor compliance with this Article.

B. Any person in the employ of CONTRACTOR or subcontractors whom OWNER may deem to be incompetent, unfit, troublesome, or otherwise undesirable, shall be excluded from the work site and shall not again be employed on it except with written consent of OWNER.

ARTICLE 40 FINGERPRINTING WORKERS

A. CONTRACTOR shall comply with the applicable requirements of Education Code sections 45125.1 and 45125.2 with respect to fingerprinting CONTRACTOR's employees and pupil safety. CONTRACTOR shall also ensure that each of its subcontractors on the Project complies with the applicable requirements of sections 45125.1 and 45125.2. To this end, CONTRACTOR must complete and submit to OWNER the certification form included in the Contract Documents for itself and its subcontractors prior to commencing work on the Project. At CONTRACTOR's expense, CONTRACTOR shall comply with any directive from OWNER specifying measures to ensure the safety of pupils, including but not limited to one or more measures described in Education Code section 45125.2(a).

B. Should CONTRACTOR or any subcontractor feel its employees will have limited or less contact with OWNER's pupils, application shall be made to OWNER for a determination on that question. The determination by OWNER shall be final. In the event OWNER makes a determination of limited or less contact with pupils, CONTRACTOR shall comply with any directive by OWNER to ensure the safety of pupils, at CONTRACTOR's expense.

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C. Use of Education Code section 45125.2(a)(1), (2), or (3) for compliance with these fingerprinting requirements is subject to prior OWNER approval. The determination by OWNER on the application of any of these sections shall be final.

D. In no event shall any employee of CONTRACTOR or its subcontractors come into contact with OWNER's pupils before the certification is completed and approved by OWNER.

ARTICLE 41 WAGE RATES AND PAYROLL RECORDS

A. Pursuant to the provisions of Article 2 (commencing at Section 1770), Chapter 1, Part 7, Division 2, of the California Labor Code, OWNER has ascertained the general prevailing rate of per diem wages for each craft, classification, or type of worker needed to execute the work of the Project in the locality in which this public work is to be performed. The general prevailing rates of per diem wages are available at OWNER's office. CONTRACTOR is responsible to pay those rates determined to be applicable by the Director of the Department of Industrial Relations and OWNER shall not be responsible for any damages arising from the error.

B. When permitted by law, holiday and overtime work shall be paid at a rate of at least one and one-half times the specified rate of per diem wages, unless otherwise specified.

C. CONTRACTOR shall pay and shall cause to be paid to each worker engaged in work on the Project not less than the general prevailing rate of per diem wages, regardless of any contractual relationship which may exist between CONTRACTOR or any Subcontractor and such workers.

D. Pursuant to Labor Code Section 1775, CONTRACTOR shall forfeit and OWNER shall withhold from payments to CONTRACTOR not more than \$200 for each calendar day any worker is paid less than the established prevailing wage rates for the work or craft in which the worker is employed by CONTRACTOR on the Project. The difference between the established prevailing wage rates and the amount paid to each worker for each whole or partial calendar day for which each worker was paid less than the established prevailing wage rates shall be paid to each worker by CONTRACTOR.

E. Any worker employed to perform work on the Project which is not covered by any classification available in OWNER's office, shall be paid not less than the minimum rate of wages specified for the classification which most nearly corresponds with work to be performed by him, and that minimum wage rate shall be retroactive to the time of initial employment of the person in the classification.

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F. Pursuant to Labor Code Section 1773.1, per diem wages are deemed to include employer payments for health and welfare, pension, vacation, travel, subsistence, apprenticeship, and similar purposes.

G. At appropriate conspicuous points on the site of the Project, CONTRACTOR shall post job site notices prescribed by the Department of Industrial Relations, including but not limited to, a schedule showing all determined minimum wage rates and all authorized deductions, if any, from unpaid wages actually earned.

H. CONTRACTOR shall submit a breakdown of all labor costs for this Project by trade. This breakdown shall be for all labor that CONTRACTOR or any subcontractor supplies to the Project. This information shall be provided to OWNER before the <u>first</u> <u>payment request</u> after the Notice to Proceed has been issued. Failure to provide the labor cost breakdown will result in delay in processing the payment request until the complete cost breakdown is provided by CONTRACTOR and received and approved by OWNER. No other labor expenses will be considered unless approved in writing by OWNER.

I. Pursuant to the provisions of Labor Code Section 1776, CONTRACTOR shall keep and shall cause each Subcontractor performing any portion of the work on the Project to keep an accurate payroll record, showing the name, address, social security number, work classification, straight time, and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by CONTRACTOR in connection with the Work. Each payroll record shall contain or be verified by a written declaration that it is made under penalty of perjury, stating that (1) the information contained in the payroll record is true and correct, and (2) the employer has complied with the requirements of Sections 1771, 1811, and 1815 for any work performed by the employer's employees on the Project.

J. The payroll records required under this article shall be certified and shall be available for inspection at all reasonable hours at CONTRACTOR's principal office 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 required payroll records shall be made available for inspection or furnished upon request to a representative of OWNER, the Division of Labor Standards Enforcement, and/or the Division of Apprenticeship Standards of the Department of Industrial Relations;

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3. A certified copy of all payroll records required under this article shall be made available for inspection or copies made upon request by the public; provided, however, that a request by the public shall be made through either OWNER, the Division of Apprenticeship Standards, or the Department of Industrial Relations. If the requested payroll records have not been provided pursuant to Paragraph 2 above, prior to being provided the records, the requesting party shall reimburse the costs of preparation by CONTRACTOR, Subcontractors, and the entity through which the request was made. The public shall not be given access to the records at CONTRACTOR's principal office.

4. The form of certification shall be as follows:

I, _______(*printed name*), the undersigned, am the (*position in business*) with the authority to act for and on behalf of ______(*name of business and/or CONTRACTOR*), and certify under penalty of perjury that the records or copies submitted and consisting of _______(*description, number of pages*) are the originals or true, full, and correct copies of the originals which depict the payroll record(s) of the actual disbursements by way of cash, check, or whatever form to the individual or individuals named.

Dated: _____ Signature:

K. CONTRACTOR shall file a certified copy of the required payroll records with the entity requesting the records within 10 days after receipt of a written request. In the event CONTRACTOR fails to comply within the 10-day period, as a penalty to OWNER CONTRACTOR shall forfeit \$100 for each calendar day, or portion of each calendar day, for each worker until strict compliance is effectuated. Upon request by the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due.

L. Payroll records made available for inspection as copies and furnished upon request to the public by OWNER, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement shall be marked or obliterated to prevent disclosure of an individual's name, address, and social security number. Payroll records furnished to agencies that are included in the Joint Enforcement Strike Force on the Underground Economy and other law enforcement agencies investigating violations of law shall be unredacted. The name and address of CONTRACTOR shall not be marked or obliterated in either case.

M. CONTRACTOR shall inform OWNER of the location of the payroll records, including the street address, city, and county, and within five working days shall provide a written notice of a change of location and address.

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N. It shall be CONTRACTOR's responsibility to ensure compliance with the provisions of this article and the provisions of Labor Code Section 1776.

O. This project is subject to prevailing wage monitoring and enforcement by the Department of Industrial Relations. CONTRACTOR and all subcontractors shall be subject to the requirements of Subchapter 4.5 of Chapter 8 of Title 8 of the California Code of Regulations. Contractor and all subcontractors must furnish electronic certified payroll records to the DIR on the frequency specified in the Notice Calling for Bids using the DIR's eCPR system. To enroll in the eCPR system or obtain additional information and assistance, CONTRACTOR is directed to the DIR website at www.dir.ca.gov/Public-CONTRACTOR shall comply with Works/Certified-Payroll-Reporting.html. all requirements of the Labor Code and attendant regulations pertaining to prevailing wage monitoring and compliance as indicated in the Contract Documents, and/or as required by the DIR. CONTRACTOR shall permit OWNER, the DIR or their designee to interview CONTRACTOR's employees concerning compliance with prevailing wage, apprenticeship, and related matters, whether or not during work hours, and shall require each subcontractor to provide OWNER, the DIR or their designee with such access to its employees.

ARTICLE 42 APPRENTICES

A. CONTRACTOR acknowledges and agrees that the Contract Documents are governed by the provisions of Labor Code Section 1777.5 where applicable. It shall be CONTRACTOR's responsibility to ensure compliance with this article and with Labor Code Section 1777.5 for all apprenticing occupations.

B. Apprentices of any crafts or trades may be employed, and when required by Labor Code Section 1777.5, shall be employed provided they are properly registered in full compliance with the provisions of the Labor Code.

C. Every apprentice shall be paid the prevailing rate of per diem wages for apprentices in the trade to which the apprentice is registered, and shall be employed only at the work of the craft or trade to which the apprentice is registered.

D. Only apprentices as defined in Labor Code Section 3077 who are in training under apprenticeship standards that have been approved by the Chief of the Division of Apprenticeship Standards, and who are parties to written apprentice agreements under Chapter 4 (commencing at Section 3070), Division 3, of the Labor Code, are eligible to be employed on public works. The employment and training of each apprentice shall be in accordance with either (1) the apprenticeship standards and apprentice agreements

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under which the apprentice is in training, or (2) the rules and regulations of the California Apprenticeship Council.

E. Pursuant to Labor Code Section 1777.5, CONTRACTOR and any subcontractors employing workers in any apprenticeship craft or trade performing any work under the Contract Documents shall employ apprentices in at least the ratio set forth in Labor Code Section 1777.5, and may apply to any apprenticeship program in the craft or trade that can provide apprentices to the project site for a certificate approving CONTRACTOR or Subcontractor under the applicable apprenticeship standards for the employment and training of apprentices in the area of industry affected.

F. Prior to commencing work on the Project, CONTRACTOR shall submit contract award information to an applicable apprenticeship program that can supply apprentices to the project site. The information submitted shall include an estimate of journeyman hours to be performed on the Project, the number of apprentices proposed to be employed, and the approximate dates the apprentices would be employed. A copy of this information shall also be submitted to OWNER if requested. Within 60 days after concluding work on the Project, CONTRACTOR and all Subcontractors shall submit a verified statement of the journeyman and apprentice hours performed on the Project to the awarding body, if requested, and to the apprenticeship program. This information shall be public.

G. If in performing any of the Work, CONTRACTOR employs journeymen or apprentices in any apprenticeable craft or trade, CONTRACTOR shall contribute to the California Apprenticeship Council the same amount that the Director of Industrial Relations determines is the prevailing amount of apprenticeship training contributions in the area of the Project, subject to any credits permitted by law.

H. If CONTRACTOR or any Subcontractor is determined by the Chief of the Division of Apprenticeship Standards to have knowingly violated Labor Code Section 1777.5, it shall:

1. Forfeit as a civil penalty an amount not exceeding \$100 (\$300 for knowing subsequent violations) for each full calendar day of noncompliance. Notwithstanding Labor Code Section 1727, upon receipt of a determination that a civil penalty has been imposed by the Labor Commissioner, OWNER shall withhold the amount of the civil penalty from contract progress payments then due or to become due.

2. In lieu of the monetary penalty, for a first-time violation and with the concurrence of a specified apprenticeship program, the Labor Commissioner may order CONTRACTOR or any Subcontractor to provide apprentice employment

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equivalent to the work hours that would have been provided for apprentices during the period of noncompliance.

3. In the event CONTRACTOR or any Subcontractor is determined by the Labor Commissioner to have knowingly committed a serious violation of any provision of Section 1777.5, the Labor Commissioner may also deny CONTRACTOR or any Subcontractor, and their responsible officers, the right to bid on or be awarded or perform work as a subcontractor on any public works contract for a period of up to one year for the first violation and up to three years for a subsequent violation.

CONTRACTOR or any Subcontractor (or responsible officer) shall have the right to obtain a review of the determination imposing a debarment or civil penalty as provided by law.

I. CONTRACTOR and all Subcontractors shall comply with Labor Code Section 1777.6, which forbids certain discriminatory practices in the employment of apprentices.

J. CONTRACTOR shall become fully acquainted with the law regarding apprentices prior to commencement of the work. Special attention is directed to Labor Code Sections 1777.5, 1777.6, and 1777.7, and Title 8, California Code of Regulations, Section 200 et seq. Questions may be directed to the State Division of Apprenticeship Standards, 455 Golden Gate Avenue, San Francisco, California.

ARTICLE 43 HOURS OF WORK

A. CONTRACTOR shall furnish, and shall require all Subcontractors to furnish, sufficient forces to ensure the Work is prosecuted in accordance with the detailed project schedule without payment of overtime wage rates whenever possible.

B. As provided in Article 3 (commencing at Section 1810), Chapter 1, Part 7, Division 2 of the Labor Code, eight hours of labor shall constitute a legal day of work. The time of service of any worker employed at any time by CONTRACTOR, or by any subcontractor, upon the Work or upon any part of the work contemplated by the Contract Documents is limited and restricted to eight hours per day and 40 hours during any one week. Upon completion of all hours worked in excess of eight hours per day, work shall be permitted upon this Project at not less than one and one-half times the basic rate of pay.

C. CONTRACTOR shall keep, and shall cause all subcontractors to keep, an accurate record showing the name and actual hours worked each calendar day and each calendar week by each worker employed in connection with the Work or any part of the Work contemplated by the Contract Documents. The record shall be kept open at all

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reasonable hours to the inspection of OWNER and to the Division of Labor Standards Enforcement, Department of Industrial Relations.

D. Saturdays, Sundays, holidays (including all OWNER designated holidays), and any day with work hours before 7:30 a.m. and/or after 4 p.m. shall be considered overtime for OWNER's representatives, consultants, and inspectors, and shall be compensated as such by CONTRACTOR per OWNER's submitted invoice. Such cost shall be billed to CONTRACTOR and deducted from subsequent progress payments or the final payment.

E. As a penalty, CONTRACTOR shall pay \$25 to the Department of Industrial Relations or OWNER for each worker employed by CONTRACTOR or by any subcontractor in the performance of the Contract Documents for each calendar day during which the worker is required or permitted to work more than eight hours in any calendar day and 40 hours in any one calendar week in violation of the provisions of Article 3 (commencing at Section 1810), Chapter 1, Part 7, Division 2 of the Labor Code.

F. Any work performed before or after regular working hours or on Saturdays, Sundays, or holidays (including all OWNER designated holidays) shall be performed without additional expense to OWNER. Should inspection or testing services be necessary on a Saturday, Sunday, or holiday (including all OWNER designated holidays), CONTRACTOR shall pay all additional expenses incurred. Such cost shall be billed to CONTRACTOR and deducted from the next payment.

G. CONTRACTOR shall anticipate work that would occur outside the normal work hours of 7:30 a.m. to 4 p.m. Such activities would include but are not limited to early morning concrete pours (because of hot weather), early or late material deliveries, required off-site inspections, or any other activity that would require the Project Inspector or OWNER personnel to work longer than an eight-hour day.

H. The Project Inspector cannot be asked to leave the Project after eight hours of work so CONTRACTOR would not have to pay overtime. If the extended work day is a result of CONTRACTOR'S work, the Project Inspector will perform its DSA assigned work as necessary to assure the Project is kept on schedule and CONTRACTOR is responsible to pay all costs associated with fulfilling these DSA assignments, including the Project Inspector's overtime. These costs shall be billed to CONTRACTOR and deducted from subsequent progress payments or the final payment.

ARTICLE 44 NONDISCRIMINATION

In the performance of the terms of the Contract Documents, CONTRACTOR agrees that it will not engage in or permit any Subcontractor it may employ to engage in unlawful discrimination in employment of persons because of the race, religious creed, color,

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national origin, ancestry, physical handicap, medical condition, marital status, or sex of such persons.

ARTICLE 45 COST BREAKDOWN AND PERIODICAL ESTIMATES

A. On forms approved by OWNER, CONTRACTOR shall furnish the following:

1. Within 10 calendar days of award of contract, a detailed estimate giving a complete breakdown of contract price for each Project or site, which shall include all Subcontractor/supplier agreements showing dollar amounts of these agreements to justify the schedule of values; and

2. A periodical itemized estimate of work done for the purpose of making partial payments; and

3. A schedule of estimated monthly payments due CONTRACTOR within 10 days of request by OWNER.

B. Values employed in making up any of these schedules are subject to the Architect's written approval and will be used only for determining basis of partial payments and will not be considered as fixing a basis for additions to or deductions from contract price unless OWNER in its sole discretion so elects.

ARTICLE 46 PAYMENTS

A. Unless otherwise specified in writing, each month within 30 days after receipt by OWNER of the monthly progress schedule and the certification of application for payment by the Architect, OWNER shall pay to CONTRACTOR a sum equal to 95 percent of the value of work performed and materials delivered subject to or under the control of OWNER and unused up to the last day of the previous month, less aggregate previous payments. In its sole discretion, OWNER may also deduct from these payments any amounts deemed due from CONTRACTOR.

B. Monthly payments shall be made only on the basis of monthly estimates which shall be prepared by CONTRACTOR on a form approved by OWNER and filed before the fifth day of the month during which payment is to be made.

C. Before consideration of a request for payment, a certificate in writing shall be obtained from the Architect stating that the work for which the payment is demanded has been performed in accordance with the terms of the Contract Documents and that the amount stated in the certificate is due under the terms of the Contract Documents. The

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certificate shall be attached to and made a part of the payment request filed with OWNER. The certificate of the Architect shall not be conclusive upon OWNER, but advisory only.

D. If within three days after written demand the Architect fails to deliver such certificate, CONTRACTOR may file its payment request with OWNER without the certificate, but the request shall be accompanied by a statement that demand was made for the certificate and was refused. OWNER will then either allow the payment request as presented or shall by an order entered on the minutes of OWNER state the reasons for refusing to make payment.

E. Work completed as estimated shall be an estimate only and no inaccuracy or error in an estimate shall operate to release CONTRACTOR or Surety from any damages arising from such work or from enforcing each and every provision of the Contract Documents, and OWNER shall have the right to subsequently correct any error made in any estimate for payment.

F. CONTRACTOR SHALL NOT BE ENTITLED TO HAVE ANY PAYMENT REQUESTS PROCESSED OR ANY PAYMENT FOR WORK PERFORMED SO LONG AS CONTRACTOR HAS FAILED TO COMPLY WITH ANY LAWFUL OR PROPER DIRECTION CONCERNING THE WHOLE OR ANY PORTION OF THE WORK GIVEN BY OWNER OR THE ARCHITECT.

G. OWNER has discretion to require from CONTRACTOR any of the following information with the application for payment: (1) certified payroll covering the period of the prior application for payment, (2) unconditional waivers and releases from all Subcontractors/suppliers for which payment was requested under the prior application for payment, (3) receipts or bills of sale for any items. In addition, upon submittal of the first payment request, a complete per diem wage rate breakdown for all trades must be submitted in order for the payment request to be processed.

H. PAYMENT BY OWNER OF ANY PAYMENT REQUEST IS NOT AN INDICATION THAT OWNER HAS INSPECTED, APPROVED, OR ACCEPTED ANY PART OF THE WORK, NOR SHALL PAYMENT CONSTITUTE A WAIVER IN ANY RESPECT OF ANY OWNER RIGHTS.

I. The final payment of 5 percent of the value of the work done under the Contract Documents, if unencumbered, may be made 35 days after the Notice of Completion is recorded by OWNER. ACCEPTANCE WILL BE MADE ONLY BY ACTION OF THE GOVERNING BOARD OR OTHER GOVERNING BODY OF OWNER IN ACCORDANCE WITH THE PROVISIONS ON "COMPLETION."

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J. Unless otherwise agreed in writing, on or before making request for final payment of the undisputed amount due under the Contract Documents, CONTRACTOR shall submit to OWNER the following in writing:

1. Information on CONTRACTOR's results in attaining compliance with the OWNER's three percent participation goal for Disabled Veterans Business Enterprises;

2. A summary of all claims for compensation under or arising out of the Contract Documents, stating whether the claims are settled or unsettled and the amounts of the claims, and further specifying the date(s) upon which any required protest and/or notice was given to OWNER;

3. A written release of all claims against OWNER arising by virtue of the Project, the Work, and the Contract Documents. Payment of undisputed amounts is contingent upon receipt of this waiver.

ARTICLE 47 PAYMENTS BY CONTRACTOR

CONTRACTOR shall pay:

A. All transportation and utility services not later than the 20th day of the calendar month following the month in which the services are rendered;

B. Ninety-five percent of the cost of all materials, tools, and other expendable equipment, not later than the 20th day of the calendar month following the month in which the materials, tools, and equipment are delivered to the project site, and the balance of the cost not later than the 30th day following completion of that part of the work in which the materials, tools, and equipment are incorporated or used; and

C. To each of its subcontractors the respective amounts allowed CONTRACTOR on account of work performed by each subcontractor not later than the fifth day following each payment to CONTRACTOR.

ARTICLE 48 PAYMENTS WITHHELD

A. In addition to any amount(s) which OWNER may retain under the article entitled "PAYMENTS," OWNER may withhold sufficient amount(s) of any payment(s) otherwise due to CONTRACTOR, as in its judgment may be necessary to cover the following:

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1. Payments which may be past due and payable for claims against CONTRACTOR or any Subcontractors at any level for labor or materials furnished in the performance of work under the Contract Documents.

2. Defective work not remedied.

3. Failure of CONTRACTOR to make proper payments to its subcontractor(s) or material suppliers for materials or labor.

4. Completion of work if there exists a reasonable doubt that the work can be completed for the balance then unpaid.

5. Damage to another contractor.

6. All costs and expenses associated with OWNER having to acquire alternate educational facilities if CONTRACTOR fails to complete the Project within the period of time required by the Contract Documents.

7. Project schedule not up-to-date with the current payment request.

8. Overtime charges due consultants, Project Inspectors, the Architect, and OWNER or others as a result of extra services that were provided at CONTRACTOR's request or as a result of actions of CONTRACTOR or those employed by CONTRACTOR, including subcontractors, material suppliers, or others will be withheld from current payment requests.

9. CONTRACTOR agrees that OWNER may withhold 150 percent of the estimated cost of any additional testing or retesting required as a result of the fault or negligence of CONTRACTOR, or Subcontractors, vendors, or suppliers, until such time as OWNER receives confirmation that payment for such additional testing or retesting has been made.

10. Failure to maintain a current record set of drawings. The drawings shall be updated to the date when the payment request is submitted.

11. Failure to submit daily reports.

12. Failure to submit items required to accompany payment requests at initial and final completion.

13. Failure to submit and keep current any construction schedule required by the Contract Documents.

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14. Failure to compensate the Architect for substitution review within the required time period.

15. Failure to compensate OWNER for overtime charges for OWNER representatives and employees incurred as a result of services provided during the current payment period.

16. Failure to compensate OWNER and/or the Architect for the cost of review time to evaluate CONTRACTOR'S proposed solutions to effect repair of work not in accordance with Contract Documents.

17. Failure to submit per diem wage rates for all trades pursuant to appropriate provisions of the General Conditions.

18. Penalties for violation of labor laws.

19. Cost of site clean-up.

20. Required payments to indemnify, hold harmless, or defend OWNER.

21. Compensation for unpaid extra services for the Architect caused by CONTRACTOR.

22. Compensation for unpaid extra services for the Project Inspector, including but not limited to reinspection required due to CONTRACTOR's failed tests, installation of unapproved or defective materials, or CONTRACTOR's requests for inspection and failure to attend the requested inspection.

23. Any liquidated damages, forfeiture of fees, or other damages assessed against CONTRACTOR by reason of failure to complete the Project on time.

B. OWNER may apply the withheld amount(s) to the payment of any claims or obligations at its discretion. In so doing, OWNER shall be deemed the agent of CONTRACTOR and any payment made by OWNER shall be considered to be a payment made under the Contract Documents by OWNER to CONTRACTOR, and OWNER shall not be liable to CONTRACTOR for the payments made in good faith. The payments may be made without prior judicial determination of the claim or obligations. OWNER shall submit to CONTRACTOR an accounting of the funds disbursed on behalf of CONTRACTOR.

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ARTICLE 49 SUBSTITUTION OF SECURITIES

A. Pursuant to the provisions of Public Contract Code section 22300, CONTRACTOR may substitute certain securities for any funds withheld by OWNER to ensure its performance under the Contract Documents. At the request and expense of CONTRACTOR, securities equivalent to any amount withheld shall be deposited, at the discretion of OWNER, with either a state or federally chartered bank as the escrow agent, who shall then pay any funds otherwise subject to retention to CONTRACTOR. Upon satisfactory completion of the Project, the securities shall be returned to CONTRACTOR.

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

C. CONTRACTOR shall be the beneficial owner of any securities substituted for funds withheld and shall receive any interest.

D. All expenses relating to the substitution of securities under Public Contract Code section 22300 and this article, including but not limited to OWNER's overhead and administrative expenses and expenses of escrow agent, shall be CONTRACTOR's responsibility.

E. Should the value of the substituted security at any time fall below the amount for which it was substituted, or any other amount which OWNER determines to withhold, CONTRACTOR shall immediately and at CONTRACTOR'S expense deposit additional security qualifying under Public Contract Code section 22300 until the total security deposited is no less than equivalent to the amount subject to withholding under the Contract Documents.

F. In the alternative, under Public Contract Code section 22300, at its own expense, CONTRACTOR may request OWNER to make payment of earned retention funds directly to the escrow agent.

G. All escrow agreements shall be in conformance with the Escrow Agreement for Security Deposits in Lieu of Retention set forth in Public Contract Code section 22300, and shall be in the form of agreement provided by OWNER unless otherwise agreed in advance.

ARTICLE 50 PROGRESS SCHEDULE

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A. Immediately after being awarded the Construction Agreement, CONTRACTOR shall prepare an estimated progress schedule and submit it to OWNER for review. The schedule shall indicate the beginning and completion dates of all phases of construction.

B. The schedule shall be updated at reasonably required intervals throughout the Project, unless specifically required to be updated at more frequent intervals.

C. Additional scheduling requirements may be contained in the attached Supplemental General Conditions.

D. While OWNER does not discourage efforts by CONTRACTOR to accomplish an early completion of the Project, CONTRACTOR is directed to utilize and schedule the entire construction period set forth in the Construction Agreement. Any portion of the construction period not so scheduled shall be considered "float" and used the same as other float under the Contract Documents.

ARTICLE 51 EXTENSION OF TIME—LIQUIDATED DAMAGES

Α. The parties understand and agree that the goodwill, educational process, and other business of OWNER will be damaged if the Project is not completed within the time limits required. The parties have further agreed that the exact amount of damages for failure to complete the Work within the time specified is, in some cases, extremely difficult, impractical, or impossible to determine. As to those damages that are difficult, impractical, or impossible to determine, CONTRACTOR shall be assessed the sum set forth in the Contract Documents per day as liquidated damages for each and every calendar day until the work required under the Contract Documents is complete. CONTRACTOR will pay to OWNER or OWNER may retain such damages from amounts otherwise payable to CONTRACTOR. For purposes of this article, the Work shall be considered "complete" in accordance with the provisions of the article on "COMPLETION," except that the work may be considered compete without formal acceptance by the OWNER's governing board or other governing body so long as the governing board, at its next regularly scheduled meeting, accepts the work.

B. Providing CONTRACTOR has protested and/or given notice of delays on the Project as required by these Contract Documents, CONTRACTOR shall not be charged for liquidated damages as set forth above because of any delays in completion of work which are not the fault or negligence of CONTRACTOR, including but not restricted to acts of God. CONTRACTOR shall provide documentation and justification to substantiate the delay and its relation to the Project's critical path. OWNER shall ascertain the facts and extent of delay and grant extension of time for completing work when, in its judgment, the facts justify an extension. OWNER's findings of fact shall be final and conclusive on the parties. Extension of time shall apply only to that portion of work affected by the delay,

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and shall not apply to other portions of work not so affected. Any dispute pertaining to a request for time or assessment of liquidated damages shall be resolved pursuant to the provisions on resolution of construction claims in the Contract Documents.

C. In addition to any liquidated damages which may be assessed, if CONTRACTOR fails to complete the Project within the time period provided in the Contract Documents, and if as a result OWNER finds it necessary to incur any costs and/or expenses, or if OWNER receives any claims by other contractors, subcontractors, or third parties claiming time or other compensation by reason of CONTRACTOR's failure to complete work on time, CONTRACTOR shall pay all those costs and expenses incurred by OWNER. These costs and expenses may include but are not limited to such items as rental payments, inspection fees, and additional architectural fees, whether related to the acquisition of facilities or caused by the delay in completion. These costs and expenses may be retained by OWNER from any payments otherwise due to CONTRACTOR.

D. Within 10 days of the beginning of any delay (unless OWNER grants in writing a further period of time to file notice prior to the date of final completion of the Project), CONTRACTOR shall notify OWNER in writing of the causes for the delay. Failure to give the required notice in writing within the time provided shall be interpreted as a failure by CONTRACTOR to properly administer the Contract Documents, Project, and Work, and shall constitute a waiver by CONTRACTOR of all claims of any kind and nature, without limitation, arising from the delay. In addition to this notice, in any instance where CONTRACTOR claims delay was caused by OWNER, the Architect or Architect's consultants, Inspector of Record, Division of State Architect, or anyone claimed to be an agent of them, and as a precondition to any right to claim additional time, prior to making any request for time, CONTRACTOR shall have satisfied the obligation of the Contract Documents to protest the delay.

E. Extensions of time shall be based solely upon the effect of delays to the work as a whole and will not be granted unless CONTRACTOR can demonstrate through analysis of the current updated schedule that the delay was caused by one of the causes for which an extension is authorized. A time extension will not be granted unless CONTRACTOR submits a Time Impact Analysis which utilizes networking techniques (fragments) and a written analysis of the facts which are alleged to have caused the delay. Time extensions will not be allowed for delays to parts of the work not on the critical path of the currently approved monthly updated construction schedule. Time extensions will not be granted until all available float, slack, or contingency time on the Project is used and the end date of the Work is moved beyond the current adjusted contract completion date. CONTRACTOR's sole remedy for delay or extensions of time in all cases except those due to unanticipated or unreasonable delay caused by OWNER shall be an extension of the contract time at no cost to OWNER. Additional scheduling requirements in cases of delay or requests for time may be included in supplementary conditions.

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ARTICLE 52 OCCUPANCY

OWNER reserves the right to occupy buildings and/or portions of the site at any time before completion, and occupancy shall not constitute final acceptance of any part of the Work covered by the Contract Documents, nor shall such occupancy extend the date specified for completion of the Work. Beneficial occupancy of building(s) does not commence any warranty period or entitle CONTRACTOR to any additional compensation due to such occupancy, or affect in any way or amount CONTRACTOR's obligation to pay liquidated damages for failure to complete the Project on time.

ARTICLE 53 CONTRACT CLOSEOUT

A. <u>Utility Connections</u>: The building and/or buildings shall be connected to water, gas, sewer, and electric services, complete and ready for use. Service connections shall be made and existing services reconnected.

- B. <u>Record Drawings</u>:
 - 1. CONTRACTOR shall keep the following:

a. One complete set of blue line prints of all drawings which form a part of the Project in good order and available on the job site. They shall be used only for the purpose intended. Drawings shall be kept up-to-date as the Work progresses and shall be available at all times for inspection.

b. One set of annotated Specifications reflecting any and all changes to the original documents from change orders, substitutions, or any other deviations from the original specifications.

2. The intent of this procedure is to obtain an exact "as built" record of the work upon completion of the Project. The following information shall be carefully and correctly drawn on the prints and all items shall be accurately located and dimensioned from finished surfaces of building walls on all record drawings:

- a. Any work not installed as indicated on drawings.
- b. The exact locations and elevations of all covered utilities, including valves, cleanouts, etc.

3. CONTRACTOR shall certify to OWNER the accuracy of the record drawings and annotated Specifications and is liable and responsible for inaccuracies in as-

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built and/or record drawings and the annotated Specifications, even if they do not become evident until a future date.

4. Upon completion of the Work and correction of all punch list items and as a condition precedent to approval of final payment, CONTRACTOR shall obtain the Architect's review of the marked up record set of prints and annotated Specifications and employ an appropriately trained individual to transfer the asbuilt information to a form of electronic media, acceptable to the Architect and OWNER, containing the original Drawings. CONTRACTOR shall provide the electronic as-built drawings to the Architect. When as-built information has been transferred to the acceptable electronic medium and the record drawings have been reviewed by the Architect, CONTRACTOR shall pay for a duplicate set of contract drawings to be used for CONTRACTOR's record drawings. Those final corrected record drawings shall also be saved on electronic media, in a format designated by OWNER, and shall be given to OWNER. Reproduction expenses for the drawings shall be paid for by CONTRACTOR out of the allowance and any difference returned to OWNER.

5. CONTRACTOR shall deliver to the Architect three complete sets of operating manuals, repair parts lists, and service instructions for all electrical and mechanical equipment, together with equipment warranties.

C. <u>Maintenance Manuals</u>: At least 30 days prior to final inspection, three copies of complete operational and maintenance manuals shall be submitted for review. All installation, operating, and maintenance information and drawings shall be bound in $8\frac{1}{2}x$ 11" binders, indexed with tabs, and include tables of contents. Each manual shall also contain a list of subcontractors, with their addresses and the names of persons to contact in case of emergencies. Identifying labels shall provide names of manufacturers, their addresses, ratings, and capacities of equipment and machinery.

D. <u>Inspection Requirements</u>:

1. Before calling for final inspection, CONTRACTOR shall determine that the following work has been performed:

a. General construction has been completed;

b. Mechanical and electrical work complete, fixtures in place, connected and ready for tryout and test;

c. Electrical circuits scheduled in panels and disconnect switches labeled;

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d. Painting and special finishes complete;

e. Doors complete with hardware, cleaned of protective film, in good working order without sticking or binding;

f. Tops and bottoms of doors stained/painted and sealed;

g. Floors waxed and polished as specified;

h. Broken glass replaced and glass cleaned;

i. Grounds cleared of CONTRACTOR'S equipment, raked clean of debris, and trash removed from site;

j. Work cleaned, free of stains, scratches, and other foreign matter, replacement of damaged and broken material;

k. Finished and decorative work shall have marks, dirt, and superfluous labels removed;

I. All flatwork shall have all stains removed including but not limited to oil, gas, rust, paint, etc.

2. Final inspection will be made by the Architect and specified OWNER personnel upon written notification from CONTRACTOR that work has been completed. CONTRACTOR must prearrange a final inspection with OWNER and Project Inspector. There should be a minimum of seven days' notice to OWNER and Project Inspector before the final inspection is scheduled. CONTRACTOR shall receive a list (punch list) of items found unacceptable and shall promptly correct them. Upon written notification from CONTRACTOR that all items have been corrected the Architect and Project Inspector or OWNER will reinspect for final acceptance of the Project. Failure of CONTRACTOR to complete punch list items will necessitate further reinspection by the Architect and Project Inspector or OWNER. Cost of reinspection will be deducted from the amounts owing to CONTRACTOR.

3. Deliver keys (labeled) to OWNER's representative. Master keys shall be accounted for in writing.

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4. Furnish a letter to OWNER stating that a responsible representative of OWNER (give name and position) has been instructed in working characteristics of mechanical and electrical equipment.

E. <u>Guarantee</u>: Upon completion of final inspection, CONTRACTOR is to submit the guarantee to OWNER as specified in the Contract Documents.

F. <u>Manufacturer Warranties</u>: CONTRACTOR shall deliver 10 days prior to final inspection, original manufacturer warranties for all materials, equipment and/or supplies purchased and/or installed under the Contract Documents.

G. <u>Equipment Training</u>: Prior to final inspection, CONTRACTOR is responsible for providing the appropriate training for a minimum of two personnel of OWNER for each trade for the newly installed mechanical and electrical equipment required under the Contract Documents.

H. <u>Contract Closeout Items Specified Within this Article are Mandatory</u>: The parties agree that, should the required items not be furnished to OWNER, as stated or within 30 days of completion of all other work, OWNER will suffer damage which damage will be difficult, impossible or impractical to assess. For that reason, in accordance with Government Code Section 53069.85, the parties agree the following sums shall be assessed as fixed and liquidated damages and not as a penalty:

1. Record Drawings—\$25,000 or 10 percent of contract price, whichever is less;

2. Maintenance Manuals—\$5,000 or 10 percent of contract price, whichever is less;

3. Guarantee—\$25,000 or 10 percent of contract price whichever is greater;

4. Manufacturer Warranties—\$5,000 for each product or 10 percent of contract price whichever is greater;

5. Equipment Training—\$10,000 for each system or 10 percent of contract price whichever is greater.

I. In addition, the Notice of Completion will not be filed until either such amounts are paid or the items are provided. However, OWNER may also elect to file the Notice of Completion and pay retention after deducting such amounts. If CONTRACTOR disputes the amounts or OWNER's right to withhold these amounts, OWNER may withhold up to 150 percent of the disputed amount.

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ARTICLE 54 COMPLETION

A. OWNER shall accept the completion of the Project when all of the following conditions have been met:

1. The entire Work or Project (including all phases if a project is phased) including minor corrective items is completed to the satisfaction of OWNER;

2. The final DSA report has been filed with the State;

3. By action of its governing board or other governing body, OWNER has accepted the Project to be complete.

4. The Notice of Completion for the entire Project has been filed and recorded.

B. A final walk-through of the Project to determine completion of the Work and to record the Notice of Completion shall occur only upon a valid claim by CONTRACTOR that the Project is complete, including minor corrective items.

1. CONTRACTOR's Project Manager and Superintendent(s) shall attend the final walk-through. A representative(s) of OWNER shall also attend.

2. Should OWNER incur any costs by reason of an erroneous or premature claim of completion by CONTRACTOR that results in a premature walk-through, OWNER may withhold such costs from any money due or to become due to CONTRACTOR.

3. Any incomplete or corrective items shall be identified in the final walk-through of the Project.

4. Incomplete and corrective items identified in any walk-through shall be completed before CONTRACTOR calls for a subsequent walk-through, which shall be treated as and bear the same consequences as the initial call for a walk-through.

C. <u>Alternative Process</u>: OWNER shall have the option in its sole discretion to accept completion of the Work and have the Notice of Completion recorded when the entire Work is completed to OWNER's satisfaction, except for minor corrective items as distinguished from incomplete items.

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1. Should OWNER elect to accept the Work as complete prior to completion of the entire Work or Project, it shall be on the following conditions:

a. The entire Work or Project (including all phases if a project is phased), excluding minor corrective items, is complete to OWNER's satisfaction;

b. The final DSA report shall be filed with the State as soon as appropriate;

c. By action of its governing board or other governing body, OWNER has accepted the Project to be complete.

d. The Notice of Completion for the entire project has been filed and recorded.

2. Should OWNER elect to accept the Work as complete prior to completion of the entire Work or Project, there shall be a final walk-through of the Project, as follows:

a. Final walk-through shall be made upon a valid claim by CONTRACTOR that the Project is complete, excepting only minor corrective items;

b. CONTRACTOR's Project Manager and Superintendent(s) shall attend the final walk-through. OWNER may be represented by anyone designated by OWNER's Representative, including but not limited to the Project Inspector, management, and/or representatives from Maintenance and Operations;

c. Should OWNER incur any costs by reason of an erroneous or premature claim of completion by CONTRACTOR that results in a premature walk-through, OWNER may withhold such costs from any money due or to become due to CONTRACTOR.

d. All remaining work, including minor incomplete or corrective items, shall be identified in the final walk-through of the Project;

e. Incomplete and corrective items identified in any walk-through shall be completed before CONTRACTOR calls for a subsequent walk-through, which shall be treated as, and bear the same consequences as, the initial call for a walk-through.

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3. Should OWNER elect to accept the Work as complete prior to completion of the entire Work or Project, and if CONTRACTOR fails to complete the minor corrective items prior to the expiration of a 35-day period immediately following recording of the Notice of Completion, OWNER shall withhold from the final payment an amount equal to 150 percent of the estimated cost, as determined by OWNER, of each incomplete or corrective item until such time as the item is completed.

4. If at the end of an additional 30-day period, there are items remaining to be corrected, OWNER may elect to:

a. Permit additional time for completion;

b. Complete the Work at the expense of CONTRACTOR, deducting the cost of work from any amounts being withheld.

5. CONTRACTOR shall have no claim or offset as against OWNER arising or in any way connected with an election by OWNER not to accept completion of the Work until the entire Work or Project, including minor corrective items, has been completed to OWNER's satisfaction. The time taken by CONTRACTOR to complete the Work or Project, including minor corrective items, shall be a basis for assessment of liquidated damages as provided in the Contract Documents, and is not affected by any decision by OWNER to occupy all or any portion of the Work prior to completion.

ARTICLE 55 CLAIMS FOR DAMAGES

A. Pursuant to Public Contract Code section 9204, CONTRACTOR shall make all claims for payment for 1) work done by or on behalf of contractor for which payment is not otherwise expressly provided for in the Contract, 2) damages allegedly sustained by reason of any acts or omissions of OWNER or its agents, 3) time extensions, 4) relief from damages or penalties for delay or, 5) an amount disputed by OWNER by registered mail or certified mail, return receipt requested. Such written claim shall be submitted, within 10 days after the claim has arisen, is discovered or reasonably should have been discovered. CONTRACTOR shall furnish reasonable documentation to support the claim.

IF CONTRACTOR FAILS TO COMPLY WITH ANY OF THE PROVISIONS OF THIS ARTICLE CONCERNING THE SUBMISSION OF CLAIMS, ITS CLAIM(S) SHALL BE FORFEITED AND INVALIDATED.

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B. In no event shall CONTRACTOR be permitted to reserve rights to make or pursue claims of any kind, whether for compensation in any form, or for time extensions, without the OWNER's express written consent. Any attempt to make such reservation or otherwise avoid the effect of this Article shall be void and of no force or effect whatsoever.

C. Any change order executed by CONTRACTOR with such reservation or other language of qualified acceptance shall be read and interpreted as though such language did not exist. No action by OWNER is required to invalidate such language, and no oral communication or other act or omission by OWNER or anyone acting on OWNER's behalf, except OWNER's express written consent, shall be construed as acquiescence in or consent to such reservation or other qualified acceptance language.

D. CONTRACTOR shall diligently proceed with performance of the Work, and OWNER shall continue to make payment of undisputed amounts, during any time period while claims are pending.

ARTICLE 56 RESOLUTION OF CONSTRUCTION CLAIMS

A. Upon receipt of a claim, OWNER shall conduct a reasonable review of the claim, and, unless extended by mutual agreement of the parties, provide CONTRACTOR a written statement identifying what portion of the claim is disputed and what portion is undisputed within 45 days.

B. If OWNER needs approval from its governing body to provide CONTRACTOR a written statement identifying the disputed portion and the undisputed portion of the claim, and OWNER'S governing body does not meet within the 45 days or within the mutually agreed to extension of time following receipt of a claim sent by registered mail or certified mail, return receipt requested, OWNER shall have up to three days following the next duly publicly noticed meeting of its governing body after the 45-day period, or extension, expires to provide CONTRACTOR a written statement identifying the disputed portion and the undisputed portion.

C. Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after OWNER issues its written statement. If OWNER fails to issue a written statement, paragraph H. (below) shall apply.

D. If CONTRACTOR disputes OWNER'S written response, or if OWNER fails to respond to a claim issued pursuant to this section within the time prescribed, CONTRACTOR may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, OWNER shall schedule a meet and confer conference within 30 days for settlement of the dispute.

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Ε. Within 10 business days following the conclusion of the meet and confer conference, if the claim or any portion of the claim remains in dispute, OWNER shall provide CONTRACTOR a written statement identifying the portion of the claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after OWNER issues its written statement. Any disputed portion of the claim, as identified by the CONTRACTOR in writing, shall be submitted to nonbinding mediation, with OWNER and CONTRACTOR sharing the associated costs equally. OWNER and CONTRACTOR shall mutually agree to a mediator within 10 business days after the disputed portion of the claim has been identified in writing. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator. If mediation is unsuccessful, the parts of the claim remaining in dispute shall be subject to applicable procedures described in sections K through O (below).

F. For purposes of this Article, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in sections D and E, (above).

G. Unless otherwise agreed to by OWNER and CONTRACTOR in writing, the mediation conducted pursuant to section E (above) shall excuse any further obligation under Public Contract Code section 20104.4 to mediate after litigation has been commenced.

H. Failure by OWNER to respond to a claim from a contractor within the time periods described in this subdivision or to otherwise meet the time requirements of this section shall result in the claim being deemed rejected in its entirety. A claim that is denied by reason of OWNER's failure to have responded to a claim, or its failure to otherwise meet the time requirements of this section, shall not constitute an adverse finding with regard to the merits of the claim or the responsibility or qualifications of the CONTRACTOR.

I. CONTRACTOR may present to OWNER a claim on behalf of a subcontractor or lower tier subcontractor. A subcontractor may request in writing, either on his or her own behalf or on behalf of a lower tier subcontractor, that the CONTRACTOR present a claim for work which was performed by the subcontractor or by a lower tier subcontractor on behalf of the subcontractor. The subcontractor requesting that the claim be presented to OWNER shall furnish reasonable documentation to support the claim. Within 45 days of receipt of this written request, the CONTRACTOR shall notify the subcontractor in writing

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as to whether the CONTRACTOR presented the claim to OWNER and, if the CONTRACTOR did not present the claim, provide the subcontractor with a statement of the reasons for not having done so.

J. Except for tort claims, all claims or any portion of the claim(s) by CONTRACTOR remaining in dispute of \$375,000 or less shall be subject to the provisions of Public Contract Code Section 20104 et seq., except that the provisions of Public Contract Code section 20104.4 relating to mediation after litigation has commenced are excused, unless a written agreement to the contrary has been entered into between the parties.

Only claims, regardless of size, for which timely notice has been given, which have been subjected to the procedures specified in Public Contract Code section 9204, remaining "unresolved" may be pursued through litigation. All other CONTRACTOR claims are deemed waived.

K. The parties shall attempt to resolve all claims during the course of the Project using the procedures set forth in Articles 55 and 56. Pending resolution of a claim, CONTRACTOR shall diligently continue to work on the Project to completion. CONTRACTOR agrees it will neither rescind the Contract Documents nor stop the progress of the work, and CONTRACTOR'S sole remedy shall be the procedures set forth in Articles 55 and 56.

ARTICLE 57 PERFORMANCE/PAYMENT BOND

A. Unless otherwise specified in the Contract Documents, CONTRACTOR shall furnish a Performance Bond, and for any contract of \$25,000 or more, a Payment Bond, each in an amount equal to 100 percent of the price stated in the Contract Documents. All bonds shall be provided by a corporate surety admitted in California. Personal sureties and unregistered sureties are unacceptable. The Performance Bond shall remain in full force and effect through the guarantee period as specified in the Contract Documents and through such extended period as permissible to cover latent conditions.

B. All surety companies with a minimum rating of "A minus, VIII," ("A minus V" when the price stated in the Contract Documents is less than \$500,000) as rated by the current edition of Best's Key Rating Guide, published by A.M. Best Company, Oldwick, New Jersey, 08858, and admitted in California shall be presumed to be satisfactory to OWNER for the issuance of bonds. In the alternative, any admitted surety company which satisfies the requirements set forth in California Code of Civil Procedure Section 995.660 shall be accepted and approved for the issuance of bonds.

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ARTICLE 58 INSURANCE REQUIREMENTS

A. CONTRACTOR shall provide the following insurance coverages, which shall remain in full force and effect during the Project:

1. Workers' Compensation;

- 2. Comprehensive General Liability;
- 3. Comprehensive Auto Liability;

4. Asbestos Abatement (on all modernization projects and on any other projects where asbestos-containing products may be affected by construction);

5. Course of Construction/Builder's Risk.

B. All insurance companies must meet the following criteria:

1. California admitted, as confirmed by the California Department of Insurance, or listed in the California Department of Insurance's List of Eligible Surplus Line Insurers ("LESLI list")

2. A minimum rating of "A-,VIII," as rated by the current edition of Best's Key Rating Guide, published by A.M. Best Company, Oldwick, New Jersey, 08858.

C. All CONTRACTOR'S insurance policies shall name OWNER's governing board or other governing body, OWNER's consultants, the Architect, and the Architect's consultants, their officers, agents and employees as additional insureds with regard to damages and defense of claims arising from:

1. Activities performed by or on behalf of the Named Insured;

- 2. Products and completed operations of Named Insured;
- 3. Premises owned, leased or used by the Named Insured;

4. The ownership, operation, maintenance, use, loading, or unloading of any auto owned, leased, hired, or borrowed by the Named Insured.

D. Should CONTRACTOR fail to provide insurance as required by the Contract Documents, OWNER may, at OWNER's option, take out and maintain at the expense of CONTRACTOR, insurance in the name of CONTRACTOR, or subcontractor, as OWNER

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may deem proper. OWNER may deduct the cost of taking out and maintaining such insurance from any sums which are due or to become due to CONTRACTOR under the Contract Documents.

- E. Insurance coverage shall not be less than the following:
 - 1. WORKERS' COMPENSATION

a. In accordance with the provisions of Section 3700 of the California Labor Code, CONTRACTOR and every subcontractor shall be required to secure the payment of compensation to its employees.

b. In accordance with the provisions of Section 3700 of the California Labor Code, CONTRACTOR and every subcontractor shall be required to secure the payment of compensation to its employees.

C. CONTRACTOR shall at all times maintain workers' compensation insurance for all of its employees engaged in work under the Contract Documents, on or at the site of the Project. In case any of its work is sublet, CONTRACTOR shall require the subcontractor to similarly provide workers' compensation insurance for all of the subcontractors' employees. Any class of employee or employees not covered by a subcontractor's insurance shall be covered by CONTRACTOR's insurance. In case any class of employees engaged in work under the Contract Documents, on or at the site of the Project, is not protected under the workers' compensation statutes, CONTRACTOR shall provide or shall cause a subcontractor to provide adequate insurance coverage for the protection of such employees not before subcontractor commences otherwise protected work. CONTRACTOR shall file with OWNER certificates of its insurance protecting workers and a 30-day notice shall be provided to OWNER before the cancellation or reduction of any policy of CONTRACTOR or subcontractor. CONTRACTOR shall submit proof of insurance and provide endorsements on the forms provided by OWNER or on forms approved by OWNER.

d. The certificate shall reflect coverage in at least the following amounts:

(1) State workers' compensation statutory benefits policy—limits of not less than \$1,000,000.

(2) Employer's liability policy—limits of not less than \$1,000,000.

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2. COMMERCIAL GENERAL LIABILITY

a. CONTRACTOR shall take out and maintain such commercial general liability insurance as shall protect CONTRACTOR and OWNER from all claims for personal injury, including accidental death, to any person (including, as to OWNER, injury or death to CONTRACTOR's or subcontractor's employees), as well as from all claims for property damage arising from operations under the Contract Documents, in amounts set forth in this article.

b. CONTRACTOR shall require its subcontractors, if any, to take out and maintain similar general commercial liability insurance in like amounts.

c. Coverage must be written on an occurrence versus a "claims made" form with policy limits not less than \$1,000,000 per occurrence and \$2,000,000 aggregate per project on bodily injury and property damage, and include coverage for the following:

- (1) Premises operations;
- (2) Contractual liability;
- (3) Products;
- (4) Completed operations;

(5) Broad form property damage including explosion, collapse, and underground coverages;

(6) Personal injury;

d. In the event of any payment under the Commercial General Liability Policy, the insurer shall be subrogated to the extent of such payment to all the insured's rights of recovery, but the insurer shall have no rights of subrogation against OWNER, OWNER's consultants, the Architect, and the Architect's consultants, their elected or appointed officials, or employees, except as respects the negligence of OWNER, the Architect, and Architect's consultants.

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3. COMPREHENSIVE AUTO LIABILITY INSURANCE

Such insurance shall have combined single limits of not less than \$1,000,000, bodily injury, property damage, including coverage for owned, non-owned and hired autos.

4. ASBESTOS ABATEMENT

a. Must be occurrence coverage versus "claims made" coverage.

b. \$1,000,000 per occurrence with not less than \$2,000,000 annual aggregates limits required.

c. Certificates of insurance must specify "asbestos abatement."

5. COURSE OF CONSTRUCTION (COC)/BUILDER'S RISK INSURANCE

a. When required by OWNER, on new school construction project, CONTRACTOR may be required to provide builders risk coverage with limits equal to 100 percent of the insurable value of the Project, including all items of labor and materials in or adjacent to the structure insured, all materials in place or to be used as part of the permanent construction, including surplus materials, shanties, protective fences, bridges, or temporary structures, miscellaneous materials and supplies incident to the work, and such scaffolding, staging, towers, forms, and equipment as are not owned or rented by CONTRACTOR, the cost of which are included in the cost of the Work. Such insurance shall be maintained for the life of the Contract.

b. If required by OWNER, CONTRACTOR shall maintain a Builder's Risk Completed Value Form providing all risk coverage, naming CONTRACTOR and OWNER as insureds and subcontractors to all levels as additional insureds, as their respective interests appear.

c. A maximum deductible of \$5,000 per occurrence will be allowed on projects. CONTRACTOR shall be responsible for any deductibles under the property insurance policy.

d. The builder's risk insurance limits shall initially be for the full amount of the Project price shown in the Agreement document and shall be maintained in full force and effect at all times between the signing of the

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contract and final acceptance of the completed work by OWNER at an amount equaling the estimated cost to OWNER of rebuilding.

F. CONTRACTOR shall be responsible for payment of any deductibles under any of the above named coverages.

ARTICLE 59 PROOF OF INSURANCE COVERAGE

A. CONTRACTOR shall deliver in triplicate proof of carriage of required insurance. This proof shall be presented with the required Payment and Performance Bonds and return of other Contract Documents.

B. CONTRACTOR shall not commence work or allow any subcontractor to commence work under this contract until CONTRACTOR has obtained all required insurance and certificates, which shall be delivered to and approved by OWNER.

C. Certificates and insurance policies shall include the following:

1. A clause stating:

"This policy shall not be canceled or reduced in required limits of liability or amount of insurance until notice has been mailed to certificate holder stating the date of cancellation or reduction. The date of cancellation or reduction may not be less than 30 days after the date of mailing the notice."

2. Transcripts from the policies authenticated by the proper office of the insurer evidencing, in particular, those insured, the extent of the insurance, the location of and the operations to which the insurance applies, expiration date, and cancellation and reduction notice.

3. A statement that OWNER is a named additional insured under the policy described and that the insurance policy shall be primary to any insurance or self-insurance maintained by OWNER.

E. OWNER shall be named as certificate holder and additional insured and all certificates with endorsements shall be forwarded in triplicate to OWNER.

F. In the event of modification or cancellation of the policy or policies during the periods of coverage stated in this article, 30 days' prior written notice of such cancellation shall be delivered or mailed by certified mail, return receipt requested, to OWNER.

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G. Acceptance of the certificates of insurance shall not relieve or decrease CONTRACTOR's liability. Insurance coverage in the minimum amounts set forth in the Contract Documents shall not be construed to relieve CONTRACTOR of liability in excess of such coverage, nor shall it preclude OWNER from taking such other actions as are available to it under any other provisions of the Contract Documents or otherwise in law.

ARTICLE 60 INDEMNIFICATION

CONTRACTOR shall hold harmless, defend, and indemnify OWNER, the Α. Architect, and Inspector of Record and the officials, officers, employees, volunteers, and agents, and each of them, from any and all claims, demands, causes of action, costs, expenses, liability, loss, damage or injury, in law or equity, to property or persons, including wrongful death, in any manner arising out of or incident to any acts, omissions, or willful misconduct of CONTRACTOR, its officials, officers, employees, agents, consultants, and subcontractors arising out of or in connection with the performance of the Work or the Contract Documents, including without limitation the payment of all consequential damages and attorneys fees and other related costs and expenses. At CONTRACTOR's own cost, expense, and risk and with counsel reasonably satisfactory to OWNER, CONTRACTOR shall defend any and all such suits, actions, or other legal proceedings of every kind that may be brought or instituted against OWNER, the Architect, Inspector of Record, and their directors, officials, officers, employees, agents, or volunteers. CONTRACTOR shall pay and satisfy any judgment, award, or decree that may be rendered against OWNER, the Architect, Inspector of Record or their directors, officials, officers, employees, agents, or volunteers, in any such suit, action, or other legal proceeding. CONTRACTOR shall reimburse OWNER, the Architect, Inspector of Record and their directors, officials, officers, employees, agents, and volunteers, for any and all legal expenses and costs incurred by each of them in connection with any suit, action, or legal proceeding, or in enforcing the indemnity provided under this Article.

B. CONTRACTOR shall require each subcontractor to hold harmless, defend, and indemnify OWNER, the Architect, Inspector of Record and their officials, officers, employees, volunteers and agents, from any and all claims, demands, causes of action, costs, expenses, liability, loss, damage, or injury, in law or equity, to property or persons, including wrongful death, in any manner arising out of or incident to any acts, omissions, or willful misconduct of subcontractor its officials, officers, employees, agents, consultants and subcontractors arising out of or in connection with the performance of the Work or the Contract Documents, including without limitation the payment of all consequential damages and attorneys' fees and other related costs and expenses. At subcontractor's own cost, expense and risk, subcontractor shall defend any and all such suits, actions, or other legal proceedings of every kind that may be brought or instituted against OWNER, the Architect, Inspector of Record, and their directors, officials officers, employees, agents or volunteers. Subcontractor shall pay and satisfy any judgment, award, or decree that

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may be rendered against OWNER, the Architect, Inspector of Record, or their directors, officials, officers, employees, agents or volunteers, in any such suit, action, or other legal proceeding. Subcontractor shall reimburse OWNER, the Architect, Inspector of Record, and their directors, officials, officers, employees, agents, and volunteers, for any and all legal expenses and costs incurred by each of them in connection with any suit, action, or legal proceeding, or in enforcing the indemnity provided under this article.

C. The obligations of this Article expressly include but are not limited to the obligations of indemnification and defense of OWNER, the Architect, Inspector of Record, and their directors, officials, officers, agents and employees arising in any manner out of any claims against them brought by other contractors, subcontractors, material suppliers, or other third parties alleging any of them owe the claimant either time, compensation, or damages due to any act, omission, or occurrence caused or contributed to in any degree by CONTRACTOR or any of its subcontractors.

ARTICLE 61 ASSIGNMENT

CONTRACTOR shall not assign any rights, delegate any duties, transfer, convey, sublet, or otherwise dispose of the Construction Agreement or of its rights, title, or interest in or to the Construction Agreement or any part of it. If CONTRACTOR assigns, transfers, conveys, sublets, or otherwise disposes of the Construction Agreement or its right, title, or interest in it, or any part of it, any attempted or purported assignment, transfer, conveyance, sublease, or other disposition, shall be null, void, and of no legal effect whatsoever, and at OWNER's option the Construction Agreement may be terminated, revoked, and annulled, and OWNER shall then be discharged from any and all liability and obligations to CONTRACTOR, and to its purported assignee or transferee, arising out of the Construction Agreement. This expressly includes but is not limited to any attempts to create "pass through" or similar rights for subcontractors to pursue claims directly against OWNER.

ARTICLE 62 SEPARATE CONTRACTS

A. OWNER reserves the right to let other contracts in connection with this Work. CONTRACTOR shall afford other contractors reasonable opportunity for introduction and storage of their materials and execution of their work, and shall coordinate its work with those other contractors.

B. If any part of CONTRACTOR's work depends upon work of any other contractor for proper execution of results, CONTRACTOR shall inspect and promptly report in writing to the Architect any defects in the other contractor's work that render it unsuitable for proper execution or results. CONTRACTOR's failure to inspect and report shall constitute its acceptance of any other contractor's work as fit and proper for reception of its work

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except as to defects which may develop in another contractor's work after execution of CONTRACTOR's work.

C. To ensure proper execution of CONTRACTOR's subsequent work, CONTRACTOR shall measure and inspect work already in place and shall report in writing to the Architect any discrepancy between executed work and the Contract Documents.

D. CONTRACTOR shall ascertain to CONTRACTOR's satisfaction the scope of the Project and nature of any other contracts that have been or may be awarded by OWNER in connection with the Project, in order that CONTRACTOR may perform the work in light of any other contracts. Nothing contained in the Contract Documents shall be interpreted as granting to CONTRACTOR exclusive occupancy of the Project site. CONTRACTOR shall not cause any unnecessary hindrance or delay to any other contractor working on the Project. If simultaneous execution of any contract for the Project is likely to cause interference with performance of some other contract or contracts, OWNER shall decide which contractor shall cease work temporarily and which contractor shall continue or whether work can be coordinated so that the contractors may proceed simultaneously. OWNER shall not be responsible for any damage suffered or extra costs incurred by CONTRACTOR resulting directly or indirectly from the award or performance or attempted performance of any other contract or contracts on the Project, or caused by any decision or omission of OWNER regarding the order in performing or coordinating the contracts.

ARTICLE 63 OWNER'S RIGHT TO TERMINATE CONTRACT

Termination for Cause:

A. OWNER may serve upon CONTRACTOR and its surety written notice of OWNER's intention to terminate the Construction Agreement, without prejudice to any other right or remedy, upon the occurrence of any of the following circumstances:

1. If CONTRACTOR refuses or fails to pursue the Work or any part with sufficient diligence to ensure its completion within the time specified, or any extension of time;

2. If CONTRACTOR refuses or fails to complete the Work within the time required;

3. If CONTRACTOR is adjudged a bankrupt, or makes a general assignment for the benefit of its creditors;

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4. If a receiver is appointed on account of CONTRACTOR's insolvency;

5. If CONTRACTOR persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials to complete the Work in the time specified, except in cases for which extension of time is provided;

6. If CONTRACTOR fails to make prompt payment to subcontractors or for material or labor;

7. If CONTRACTOR persistently disregards laws, ordinances, or instructions of OWNER;

8. If CONTRACTOR or its SUBCONTRACTORS violates any of the provisions of the Contract Documents.

B. The notice of intent to terminate shall contain the reasons for termination.

C. Unless the identified condition(s) or violation(s) ceases and arrangements satisfactory to OWNER for correction are made within 10 days after service of the notice, the Construction Agreement may be terminated, in the total discretion of OWNER. In that event, CONTRACTOR shall not be entitled to receive any further payment until the Work is completed.

D. In the event of OWNER's election to terminate, OWNER shall immediately serve written notice of termination upon CONTRACTOR and upon surety on CONTRACTOR's Performance Bond, and the surety shall then have the right to take over and perform this contract; provided however that if within seven days after service upon the surety of the notice of election to terminate, the surety does not give OWNER written notice of its intention to take over and perform the Construction Agreement, or does not commence performance within 15 days after the date of service of the notice of termination by OWNER on surety, OWNER may take over and complete the Work by contract or by any other method it deems advisable.

E. CONTRACTOR and its surety shall be liable to OWNER for any excess cost or other damages incurred by OWNER. If OWNER takes over the Work as provided above, OWNER may exclude CONTRACTOR and the surety from the premises, or any portion of the premises, and take control of the premises without liability and without affecting the liability of CONTRACTOR and the surety for completion of the Work. In addition, OWNER may take possession of and utilize in completing the Work any materials, appliances, equipment, and other property belonging to CONTRACTOR on the work site necessary for completion of the Project, without liability.

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F. If the unpaid balance of the contract price exceeds the expense of finishing the Work, including without limitation compensation for additional architectural, managerial, inspection, and administrative services, the excess shall be paid to CONTRACTOR. If the expense exceeds the unpaid balance, CONTRACTOR shall pay the difference to OWNER. Any expenses incurred by OWNER, and any damage incurred through CONTRACTOR's default, shall be certified by the Architect.

G. These provisions are in addition to and not a limitation on any other rights or remedies available to OWNER.

Termination for Convenience:

H. OWNER has discretion to terminate this Agreement at any time and require CONTRACTOR to cease all work on the project by providing CONTRACTOR written notice of termination specifying the desired date of termination. Upon receipt of written notice from OWNER of such termination for OWNER's convenience, CONTRACTOR shall:

1. Cease operations as directed by OWNER in the notice;

2. Take any actions necessary, or that OWNER may direct, for the protection and preservation of the Work; and

3. Maintain any insurance provisions required by the Contract Documents.

In case of termination for OWNER's convenience, CONTRACTOR shall be entitled to receive payment from OWNER for work satisfactorily executed and for proven loss with respect to materials, equipment, and tools, including overhead and profit for that portion of the work completed. In the case of termination for convenience, OWNER shall have the right to accept assignment of subcontractors. The foregoing provisions are in addition to and not in limitation of any other rights or remedies available to OWNER.

ARTICLE 64 NO WAIVER

The failure of OWNER in any one or more instances to insist upon strict performance of any of the terms of the Contract Documents, or to exercise any option conferred in them, shall not be construed as a waiver or relinquishment to any extent of the right to assert or rely upon any such terms or option on any future occasion.

ARTICLE 65 EXCISE TAXES

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If any transaction under the Contract Documents constitutes a sale on which a federal excise tax is imposed under federal excise tax law, and the sale is exempt from the excise tax because it is a sale to a state or local government for its exclusive use, upon request OWNER will execute a certificate of exemption which will certify that (1) OWNER is a political subdivision of the State for the purpose of such exemption, and (2) the sale is for the exclusive use of OWNER. No excise tax for such materials shall be included in any bid price.

ARTICLE 66 NOTICE OF TAXABLE POSSESSORY INTEREST

The terms of the Contract Documents may result in the creation of a possessory interest. If a possessory interest is vested in a private party to the Contract Documents, the private party may be subjected to the payment of property taxes levied on such interest.

ARTICLE 67 ASSIGNMENT OF ANTITRUST ACTIONS

A. Public Contract Code Section 7103.5(b) provides:

"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 awarding body (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. Sect. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to the contractor, without further acknowledgment by the parties."

B. For itself and all subcontractors, CONTRACTOR agrees to assign to OWNER all rights, title, and interest in and to all such causes of action CONTRACTOR and all subcontractors may have under the Contract Documents. This assignment shall become effective at the time OWNER tenders final payment to CONTRACTOR, and CONTRACTOR shall require assignments from all SUBCONTRACTORS to comply with this requirement.

ARTICLE 68 PATENTS, ROYALTIES, AND INDEMNITIES

CONTRACTOR shall hold harmless OWNER and its governing board or other governing body, officers, agents, and employees from liability of any nature or kind, including cost and expense, for or on account of any patented or unpatented invention, process, article,

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or appliance manufactured or used in the performance of the Work of the Contract Documents, including its use by OWNER, unless otherwise specifically provided in the Contract Documents and unless such liability arises from the sole negligence, active negligence, or willful misconduct of OWNER.

ARTICLE 69 STATE AUDIT

Pursuant to and in accordance with the provisions of Government Code Section 8546.7, CONTRACTOR and any subcontractor connected with the performance of the Contract Documents involving the expenditure of public funds in excess of \$10,000, including, but not limited to the cost of administration of the Contract Documents, shall be subject to examination and audit by the State of California, either at the request of OWNER or as part of any audit of OWNER, for a period of three years after final payment is made under the Contract Documents.

ARTICLE 70 PROVISIONS REQUIRED BY LAW DEEMED INSERTED

Every provision of law and clause required by law to be inserted in the Contract Documents shall be deemed to be inserted, and the Contract Documents shall be read and enforced as though it were included. If through mistake or otherwise any provision is not inserted or is not correctly inserted, upon application of either party the Contract Documents shall be amended to make the insertion or correction. All references to statutes and regulations shall include all amendments, replacements, and enactments on the subject which are in effect as of the date of the Contract Documents and any later changes which do not materially and substantially alter the positions of the parties.

ARTICLE 71 NOTICE AND SERVICE

A. Any notice from one party to the other under the Contract Documents shall be in writing and shall be dated and signed by the party giving the notice or by a duly authorized representative of the party. Any notice shall not be effective for any purpose unless served in one of the following ways:

B. If notice is given to OWNER, by personal delivery to OWNER or by depositing the notice in the United States mail, enclosed in a sealed envelope addressed to OWNER and sent by registered or certified mail with postage prepaid.

C. If notice is given to CONTRACTOR, by personal delivery to CONTRACTOR or to CONTRACTOR's superintendent at the Project Site, or by depositing the notice in the United States mail, enclosed in a sealed envelope addressed to CONTRACTOR at its regular place of business or at such address as may have been established for the

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conduct of work under the Contract Documents, and sent by registered or certified mail with postage prepaid.

D. If notice is given to surety or other persons, by personal delivery or by depositing the notice in the United States mail, enclosed in a sealed envelope addressed to the surety or person at the address last communicated by the surety or other person to the party giving notice, and sent by registered or certified mail with postage prepaid.

ARTICLE 72 DISABLED VETERAN BUSINESS ENTERPRISE COMPLIANCE

A. In accordance with Education Code Section 17076.11, OWNER has a participation goal for disabled veteran business enterprises of at least three percent per year of the overall dollar amount of funds allocated to OWNER by the State Allocation Board pursuant to the Leroy F. Greene School Facilities Act of 1998 for construction or modernization and expended each year by the school district.

B. Prior to, and as a condition precedent for final payment under any contract for such project, CONTRACTOR shall provide appropriate documentation to OWNER identifying the amount paid to disabled veteran business enterprises in conjunction with the Contract Documents, so that OWNER can assess its success at meeting this goal.

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KNOW ALL PERSONS BY THESE PRESENTS:

WHEREAS, the Fairfax School District, (referred to as "Owner"), has awarded to (referred to as the "Contractor/ Principal") a contract for the work described as follows: MOT Building / #2023-2314.

WHEREAS, Contractor/Principal is required by Division 4, Part 6, Title 3, Chapter 5 (commencing at Section 9550) of the California Civil Code to furnish a bond in connection with the contract;

NOW, THEREFORE, we, the Contractor/Principal and as Surety, are held firmly bound unto Owner in the penal sum of Dollars (\$), lawful money of the United States of America for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if the Contractor/Principal, his/her or its heirs, executors, administrators, successors, or assigns, or a subcontractor, shall fail to pay any person or persons named in Civil Code Section 9100 or fail to pay for any materials or other supplies used in, upon, for, or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or for amounts due under the Unemployment Insurance Code with respect to work or labor thereon of any kind, or shall fail to deduct, withhold, and pay over to the Employment Development Department any amounts required to be deducted, withheld, and paid over by Section 13020 of the Unemployment Insurance Code with respect to work and labor thereon of any kind, then said Surety will pay for the same, in or to an amount not exceeding the amount set forth above, and in case suit is brought upon this bond Surety will also pay such reasonable attorney's fees as shall be fixed by the court, awarded and taxed as provided in Division 4, Part 6, Title 3, Chapter 5 (commencing at Section 9550) of the California Civil Code.

This bond shall inure to the benefit of any of the persons named in Section 9100 of the California Civil Code so as to give a right of action to such person or their assigns in any suit brought upon this bond.

It is further stipulated and agreed that the Surety of this bond shall not be exonerated or released from the obligation of the bond by any change, extension of time for performance, addition, alteration, or modification in, to, or of any contract, plans, specifications, or agreement pertaining or relating to any scheme or work of improvement described above or pertaining or relating to the furnishing of labor, materials, or equipment therefor, nor by any change or modification of any terms of payment or extension of the time for any payment pertaining or relating to any scheme or work of improvement described above, nor by any rescission or attempted rescission of the contract, agreement, or bond, nor by any conditions precedent or subsequent in the bond attempting to limit the right of recovery of claimants otherwise entitled to recover under any such contract or agreement or under the bond, nor by any fraud practiced by any person other than the claimant seeking to recover on the bond, and

that this bond be construed most strongly against the Surety and in favor of all persons for whose benefit such bond is given, and under no circumstances shall Surety be released from liability to those for whose benefit such bond has been given, by reason of any breach of contract between the Owner and original contractor or on the part of any obligee named in such bond, but the sole conditions of recovery shall be that claimant is a person described in Section 8400 and 8402 of the California Civil Code and has not been paid the full amount of his/her or its claim and that Surety does hereby waive notice of any such change, extension of time, addition, alteration, or modification.

Any claims under this bond may be addressed to:

Name & address of Surety

Name & address of agent or representative in California, if different than above

Telephone # of Surety, or agent or representative in California

IN WITNESS WHEREOF, we have hereto set our hands and seals on this day of , 20 .

[SEAL]

Contractor/Principal

By:

Signature

Print Name Above

Print Title Above

Surety:

By:

Signature

Print Name Above

Print Title Above [SEAL AND NOTARIAL ACKNOWLEDGMENT OF SURETY]

13-PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS:

WHEREAS, the Fairfax School District (referred to as "Owner"), has awarded to (referred to as "Contractor/Principal") a contract for the work described as follows:

NOW, THEREFORE, we, the Contractor/Principal and , as Surety, are held firmly bound unto Owner in the penal sum of \$ Dollars (\$), lawful money of the United States of America for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITIONS OF THIS OBLIGATION IS SUCH THAT, if the hereby bonded Contractor/Principal, its heirs, executors, administrators, successors, or assigns, shall in all things stand to and abide by and well and truly keep and perform all the undertakings, terms, covenants, conditions, and agreements in the said contract and any alteration thereof, made as therein provided, including but not limited to the provisions regarding contract duration, indemnification, and liquidated damages, all within the time and in the manner therein designated in all respects according to their true intent and meaning, then this obligation shall become null and void; otherwise, it shall be and remain in full force and effect.

As a condition precedent to the satisfactory completion of the contract, the above obligation shall hold good for a period of year(s) after the acceptance of the work by the Owner, during which time if Contractor/Principal shall fail to make full, complete, and satisfactory repair and replacements and totally protect the Owner from loss or damage made evident during the period of year(s) from the date of completion of the work, and resulting from or caused by defective materials or faulty workmanship, the above obligation in penal sum thereof shall remain in full force and effect. The obligation of Surety under this bond shall continue so long as any obligation of Contractor/Principal remains.

Whenever Contractor/Principal shall be, and is declared by the Owner to be, in default under the contract, the Owner having performed the Owner's obligations under the contract, the Surety shall promptly remedy the default, or shall promptly:

1. Complete the contract in accordance with its terms and conditions; or

2. Obtain a bid or bids for completing the contract in accordance with its terms and conditions, an upon determination by Surety of the lowest responsive and responsible bidder, arrange for a contract between such bidder and the Owner, and make available as work progresses sufficient funds to pay the cost of completion less the balance of the contract price, but not exceeding, including other costs and damages for which Surety may be liable under this Performance Bond, the amount set forth above. The term "balance of the contract price" as used in this paragraph shall mean the total amount payable to Contractor/Principal by the Owner under the contract and any modifications to it, less the amount previously paid by the Owner to the Contractor/Principal.

Surety expressly agrees that the Owner may reject any contractor or subcontractor which may be proposed by Surety in fulfillment of its obligations in the event of default by the Contractor/Principal.

Surety shall not utilize Contractor/Principal in completing the contract nor shall Surety accept a bid from Contractor/Principal for completion of the work if the Owner, when declaring the Contractor/Principal in default, notifies Surety of the Owner's objection to Contractor/Principal's further participation in the completion of the work.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the Owner named herein or the successors or assigns of the Owner. Any suit under this bond must be instituted within the applicable statute of limitations period.

FURTHER, for value received, the Surety hereby stipulates and agrees that no change, extension of time, alternation, or modification of the Contract Documents, or of the work to be performed under them, shall in any way affect its obligations on this bond; and it does hereby waive notice of any change, extension of time, alteration, or modification of the Contract Documents or of work to be performed under them.

Contractor/Principal and Surety agree that if the Owner is required to engage the services of an attorney in connection with the enforcement of this bond, each shall pay Owner's reasonable attorney's fees incurred, with or without suit, in addition to the above amount.

Any claims under this bond may be addressed to:

Name and address of Surety:

Name and address of agent or representative in California, if different than above:

Telephone number of Surety, or agent or representative in California:

IN WITNESS WHEREOF, we have hereto set our hands and seals on this day of , 20

[SEAL]

CONTRACTOR/PRINCIPAL

By___

Signature

Type or Print Name Above

Type of Print Title Above

SURETY

By_____ Signature

Type or Print Name Above

Type of Print Title Above

[SEAL AND NOTARIAL ACKNOWLEDGMENT OF SURETY]

14-WORKERS' COMPENSATION CERTIFICATE

PROJECT TITLE: BID #: MOT Building / #2023-2314 OWNER: Fairfax School District

Labor Code Section 3700 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, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his or her employees.

"(c) For any county, city, city and county, municipal corporation, public district, public agency, or any political subdivision of the state, including each member of a pooling arrangement under a joint exercise of powers agreement (but not the state itself), by securing from the Director of Industrial Relations a certificate of consent to self-insure against workers' compensation claims, which certificate may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to administer workers' compensation claims properly, and to pay workers' compensation claims that may become due to its employees. On or before March 31, 1979, a political subdivision of the state which on December 31, 1978, was uninsured for its liability to pay compensation, shall file a properly completed and executed application for a certificate of consent to self-insure against workers' compensation claims. The certificate shall be issued and be subject to the provisions of Section 3702."

I am aware of the provisions of 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 and during the performance of the work on this Project.

Print Name of Contractor Above

By:_____

Date:

Print Name Above Title:

[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.]

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15-GUARANTEE

PROJECT TITLE: BID #: MOT Building / #2023-2314 OWNER: Fairfax School District

We guarantee that the construction work described above has been performed in accordance with, and complies with, the Contract Documents. We agree to repair or replace any or all of the work, together with any other adjacent work which may be required in connection with it, that may prove to be defective in workmanship or material within a period of one year from the date of acceptance of the project by Owner and the filing of the final verified report with the Division of State Architect (DSA), ordinary wear and tear excepted.

In the event of our failure to comply with these conditions within the applicable time frame as determined by Owner pursuant to the Contact Documents, in no event later than one week after being notified in writing by Owner, we authorize Owner to proceed to have the defects repaired at our expense, for which we will pay the costs and charges upon demand.

Date:

Name of Contractor

By:___

Signature Print Name: Title:

Representative of Contractor to be Contacted for Service:

Name:

Address:

Telephone number of Contact:

16-FINGERPRINTING CERTIFICATION BY CONTRACTORS

Fairfax School District (referred to as "Owner") MOT Building / #2023-2314 (Project Identification)

Ι,

[type or print name]		
		Owner of the company named below
		Partner of the partnership named below
[check one]		President or CEO of the corporation named below
		Principal of the joint venture named below
		Other [specify]

The contracting entity named below is a contractor on the referenced project and as such hereby certifies:

- □ [For compliance with Education Code Section 45125.2(a)(1)] That a physical barrier will be erected at the workplace to limit employee contact with Owner's pupils.
- □ [For compliance with Education Code Section 45125.2(a)(2)] That the contracting entity named below will provide continual supervision and monitoring of the employees of the entity and its subcontractors through its employee . It has been ascertained by the Department of Justice that the named employee has not been convicted of a violent or serious felony. Contractor has requested subsequent arrest information from the Department of Justice concerning such employee and will immediately notify District and remove the employee from the Project if subsequent arrest information indicates the employee has been convicted of a serious or violent felony.
- □ [For compliance with Education Code Section 45125.2(a)(3)] That the contracting entity named below has contracted with Owner for reimbursement of Owner expense incurred in providing surveillance by school personnel of the employees of the entity and its subcontractors on the Project.
- □ [For compliance with Education Code Section 45125.1(g). Note: We believe this section may still be applicable to construction contractors where 45125.2(a) is insufficient to ensure pupil safety, e.g., where workers will be simultaneously working at various locations on a school site.]

That neither myself nor any employees of the contracting entity named below or its subcontractors on the Project who are required by law to submit or have their fingerprints submitted to the Department of Justice, and who may come in contact with pupils, have been convicted of a felony defined in Education Code Section 45122.1.

□ [For compliance where there is limited contact or less with pupils] That the contracting entity named below is exempt from fingerprinting requirements as the Owner has determined the employees of the entity and its subcontractors will have no more than limited contact with Owner's pupils during the Project.

[name of contracting entity]

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

SIGNATURE

DATE:

[check one or more]

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17-DAVIS BACON COMPLIANCE CERTIFICATION

PROJECT TITLE/ BID #: MOT Building / #2023-2314 OWNER: Fairfax School District

I hereby certify that I will conform to the Davis Bacon Act regarding wages, on-site audits with 48-hour notice, payroll records, submittals of weekly certified payrolls to the Owner, and apprentice and trainee employment requirements.

Date:

Name of Contractor Above

By:___

Signature

Print Name:

Print Title:

[THIS FORM IS TO BE USED ON CONSTRUCTION PROJECTS UNDER CONTRACTS ENTERED INTO OR FINANCED BY OR WITH THE ASSISTANCE OF THE FEDERAL GOVERNMENT.]

18-ESCROW AGREEMENT FOR SECURITY DEPOSITS IN LIEU OF RETENTION

This Escrow Agreement is made and entered into by and between Owner Fairfax School District, whose address is 1500 S. Fairfax Road, Bakersfield, CA 93307, and Contractor , whose address is ______, and Escrow Agent ______, whose address is ______.

For the consideration set forth in this Agreement, 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 Owner pursuant to the Construction Agreement entered into between the Owner and Contractor for in the amount of \$, dated (referred to as the "Construction Agreement"). Alternatively, on written request of Contractor, 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 10 days of the deposit. The market value of the securities at the time of the substitution shall be at least equal to the cash amount then required to be withheld as retention under the terms of the Construction Agreement between the Owner and Contractor. Securities shall be held in the name of and shall designate the Contractor as the beneficial owner.

2. Owner shall make progress payments to Contractor for those funds which otherwise would be withheld from progress payments under the provisions of the Construction Agreement, provided the Escrow Agent holds securities in the form and amount specified above.

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

4. Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account and all expenses of Owner. These expenses and payment terms shall be determined by 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 Escrow Agent that Owner consents to withdrawal of the amount sought to be withdrawn by Contractor.

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

8. Upon receipt of written notification from Owner certifying that the work under the Construction Agreement is final and complete, and that Contractor has complied with all requirements and procedures applicable to the Construction Agreement, 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 monies and securities on deposit and payment of fees and charges.

9. Escrow Agent shall rely on the written notifications from Owner and Contractor pursuant to Sections 6 to 8, inclusive, of this Escrow Agreement and 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 Owner and on behalf of Contractor in connection with the foregoing, and exemplars of their respective signatures, are as follows:

On behalf of Owner:	On behalf of Contractor:
Title	Title
Name Above [typed or printed]	Name Above [typed or printed]
Signature	Signature
Address:	Address:
On behalf of Escrow Agent:	

Title

Name Above [typed or printed]

Signature

Address:

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

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

OwnerContractorTitle AboveTitle AboveName Above [typed or printed]Name Above [typed or printed]SignatureSignatureEscrow AgentTitle AboveTitle AboveName Abive [typed or printed]

Signature

20-DRUG-FREE WORKPLACE CERTIFICATION

PROJECT TITLE/BID #: MOT Building / #2023-2314 OWNER: Fairfax School District

This Drug-Free Workplace Certification is required pursuant to Government Code Section 8350 and following sections, and the Drug-Free Workplace Act of 1990. The Drug-Free Workplace Act of 1990 requires that every person or organization awarded a contract 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 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 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 employeeassistance programs;
- 4. The penalties that may be imposed upon employees for drug abuse violations;

C. Requiring that each employee engaged in the performance of work on the Project be given a copy of the statement required by subdivision (a), and that as a condition of employment on the Contract 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 substances at the workplace, (b) establishing a drug-free awareness program, and (c) requiring that each employee engaged in the performance of the Contract 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 or (b) violated this certification by failing to carry out the requirements of Section 8355, the contract awarded 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 and following sections.

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

Name of Contractor

Signature

Print Name Above

Print Title Above

Date:

21-ATTACHMENT TO FORM NO.

PROJECT TITLE/ BID #: MOT Building / #2023-2314 OWNER: Fairfax School District

www.schoolslegalservice.org PUBLIC WORKS BID PACKET ATTACHMENT TO FORM NO. _____ PAGE ____ of ____

23-CONTRACTOR'S QUALIFICATIONS QUESTIONNAIRE

TO BE SUBMITTED WITH THE BID WHEN THERE HAS BEEN NO PREQUALIFICATION PROCESS

PROJECT TITLE/BID #: MOT Building / #2023-2314 OWNER: Fairfax School District

The prospective Bidder shall furnish all the following information accurately and completely. Failure to fully and completely comply with this requirement may result in rejection of any bid submitted. Additional sheets may be attached if necessary. "You" or "your" as used in this questionnaire refers to the Bidder's firm and any of its owners, officers, directors, shareholders, parties, or principals. Owner has discretion to request additional information depending on the project.

-WARNING-

Certain information may lead to a determination of non-responsibility and rejection of the bid.

(1) Firm name and address:

(2) Telephone:

(3) Type of firm: (check one) Individual
Partnership
Corp.

(4) License No.:

Class: DIR Registration No.

Name of license holder:

(5) Have you or any of your principals ever been licensed under a different name or different license number? Response must include information pertaining to principals' association outside of the firm bidding this Project. If yes, give name and license number:

(6) Names and titles of all principals of the firm:

(7) Number of years as contractor. Include only years in this type of construction and only the years with the current entity in its current form: Years

(8) Person who inspected work site for your firm:

Name: Title: Date of Inspection:

(9) Years of experience your firm has in public school construction work:

As general contractor:	Years
As subcontractor:	Years

(10) In the last five years has your firm or any of its principals defaulted so as to cause a loss to a surety? Response must include information pertaining to principals' associations outside of the firm bidding this Project. If the answer is yes, give date, name, and address of surety and details:

(11) In the last five years have you or any of your principals been assessed liquidated damages for any project? Response must include information pertaining to principals' associations outside of the firm bidding this Project. If yes, explain:

(12) In the last five years have you or any of your principals been in litigation or arbitration or a dispute of any kind on a question or questions relating to a public construction project? Response must include information pertaining to principals' association outside of the firm bidding this Project. If yes, provide name of public agency and details of the dispute. Attach additional pages as necessary.

(13) In the last five years have you or any of your principals ever failed to complete a project? Response must include information pertaining to principals' association outside of the firm bidding this Project. If yes, provide owner's name and details. Attach additional pages as necessary.

(14) In the last five years have you or any of your principals been assessed back-charges on any public works construction project? If so, explain, including the

identity of the public entity, the basis for their claims, and the final result. Attach additional pages as necessary.

(15) In the last five years have you or any of your principals ever failed to complete a project within the time frame originally set for completion, plus any extension of time granted for weather delays? An extension of time for any reason other than weather delays requires an explanation. Response must include information pertaining to principals' association outside of the firm bidding this Project. If yes, provide owner's name and details. Attach additional pages as necessary.

(16) List names, addresses, and telephone numbers of three architects or engineers with whom you have worked on a public works project in the last five years:

Project One:

Project Two:

Project Three:

(17) Conflicts of Interest: Do you now or have you in the last five years had any direct or indirect business, financial, or other connection with any official, employee, or consultant of the OWNER or architect? If yes, describe. Attach additional pages as necessary.

(18) In the last five years have you or any of your principals filed a claim for additional compensation from a public entity on a construction project? If yes, explain and include the identity of the public entity, the basis for the claim, the response by the public entity, and the final result. Attach additional pages as necessary.

(19) In the last five years have you or any of your principals ever failed to pre-qualify, or been deemed unqualified, on any public works construction project? If yes, explain and include the identity of the public entity, the basis for their claims, and the final result. Attach additional pages as necessary.

(20) In the last five years have you or any of your principals ever been declared a "non-responsible" bidder on any public works construction project? If yes, explain and include the identity of the public entity, the basis for their claims, and the final result. Attach additional pages as necessary.

(21) Staff/Roster Functions: List all members of your staff who will be assigned or responsible for work as a team member on this Project (except clerical) and show job titles, functions, years with firm, and projects completed for company. Include company officers, responsible managing employee (RME), project manager, and superintendent. Provide the following information for each individual (copy this page as many times as required).

Name and Title:

Function:

Years with firm:

Has the individual had prior exposure as a team member on one of your projects?

Yes 🗆 🛛 No 🗆

List of all school projects this person has completed for you:

Provide an organizational chart reflecting your proposed project team for the Project, including all persons on your project team.

(22) **Surety**: Indicate the names of all surety companies utilized by you in the last 10 years. Attach additional pages as necessary.

Surety Name & Address	Period Covered
Surety Name & Address	Period Covered
Surety Name & Address	Period Covered
Surety Name & Address	Period Covered

(23) Attach a notarized statement from surety company(ies) proposed to be utilized on this Project, indicating your total bonding capacity and certifying that:

A. Currently available bonding capacity exceeds the value of your contract, as estimated by the OWNER, and;

B. Surety(ies) will provide bonding of the project in the event you are awarded Project.

(24) **Insurance**: Provide a notarized statement from your workers' compensation carrier specifying your current "Experience Modification Rate" for workers' compensation for the State of California. Provide a list of above-referenced ratings and corresponding companies for the last five years.

(25) Safety:

A. Does your firm have a written Safety Program:

Yes \Box No \Box (If yes, attach copy.)

B. Does your firm have personnel permanently assigned to safety?

Yes \Box No \Box (If yes, provide names and duties.)
(26) Give the public entity's name, telephone number, and the name of the contact person for the three largest public works projects performed for a public entity, other than a school/college/university, that you have completed in the last five years: Attach additional sheets as necessary.

(27) List of References: Provide information on the three largest projects performed for a public school, college, or university in the last five years.

Contract 1:

Name:

Address:

Telephone:

Contact Person:

Type of construction project:

Dates of commencement and completion of construction project:

Contract amount:

Architect:

Architect's address:

Telephone:

DSA or public agency inspector:

Address:

Telephone:

Contract 2:

Name:

Address:

Telephone:

Contact Person:

Type of construction project:

Dates of commencement and completion of construction project:

Contract amount:

Architect:

Architect's address:

Telephone:

DSA or public agency inspector:

Address:

Telephone:

Contract 3:

Name:

Address:

Telephone:

Contact Person:

Type of construction project:

Dates of commencement and completion of construction project:

Contract amount:

Architect:

Architect's address:

Telephone:

DSA or public agency inspector:

Address:

Telephone:

I certify and declare under penalty of perjury under the laws of the State of California that the foregoing information is true, correct, and complete.

Executed this day of , 20 , at (City, County), State of

Signature

.

Print Name Above

Print Title Above

27 - IRAN CONTRACTING ACT CERTIFICATION (Public Contract Code Section 2200 et seq.)

District Project Name: MOT Building District Project Number: #2023-2314 District Contract Number: Contractor Name:

Subject to the penalties for perjury in the state of California, I (the person identified below and who has signed this certification) hereby certify that: (i) I have inherent authority or have been duly authorized by the Contractor to execute this certification on behalf of the Contractor; and (ii) the option checked below relating to the Contractor's status in regard to the Iran Contracting Act of 2010 (Public Contract Code Section 2200 et seq.) is true and correct:

□ The Contractor is not:

(i) Identified on the current list of persons and entities engaging in investment activities in Iran prepared by the California Department of General Services in accordance with subdivision (b) of Public Contract Code Section 2203; or

(ii) A financial institution that extends for 45 days or more credit in the amount of \$20,000,000 or more to any other person or entity identified on the current list of persons and entities engaging in investment activities in Iran prepared by the California Department of General Services in accordance with subdivision (b) of Public Contract Code Section 2203, if that person or entity uses or will use the credit to provide goods or services in the energy sector in Iran.

The District has exempted the Contractor from the requirements of the Iran Contracting Act of 2010 after making a public finding that, absent the exemption, the District will be unable to obtain the goods and/or services to be provided pursuant to the Contract

The price payable to the Contractor for the Project as of the date of this certification does not exceed \$1,000,000.

Certifier Signature:

Printed Name:

Title:

Executed at: , California

Date Executed:

Note: In accordance with Public Contract Code Section 2205, false certification of this form may result in civil penalties equal to the greater of \$250,000 or twice the contract amount, termination of the contract, and/or ineligibility to bid on contracts with a public entity for three years.

CERTIFICATION OF COMPLIANCE WITH ECONOMIC SANCTIONS IN RESPONSE TO RUSSIA'S ACTIONS IN UKRAINE PER GOVERNOR'S EXECUTIVE ORDER N-6-22

Per Executive Order N-6-22 ("Order"), all agencies and departments subject to the Governor's authority are directed to review their contracts and investments for compliance with the economic sanctions imposed on Russia by the United States government and the State of California. Further, all contractors and grantees that have agreements valued at \$5 million or more with agencies/departments subject to the California Governor's authority are directed to report to their contracting or grantor agency or department regarding their compliance with economic sanctions imposed by the U.S. government in response to Russia's actions in Ukraine, as well as sanctions imposed under state law, if any.

1) ATTESTATION OF COMPLIANCE:

Having conducted a good faith review, I attest that _____ (agency name) is in compliance with the economic sanctions imposed by the U.S. government in response to Russia's actions in Ukraine, as well as sanctions imposed under state law, if any.

Contractor/Provider Name (Printed):	Contract Number (s):
By (Authorized Signature):	
Printed name and title of authorized signor:	
Date of Signed Attestation of Compliance:	

2) <u>REPORT OF ACTIONS/STEPS TAKEN:</u>

If your contract with the Fairfax School District is valued at more than \$5,000,000, please attach a brief report to this notice form, on your agency letterhead describing the steps and actions, if any, you have taken in response to Russia's actions in Ukraine and to ensure compliance with the Order.

Please note that this Certification of Compliance may be subject to disclosure under the California Public Records Act. Accordingly, please do not include any confidential information or disclosures that could pose security risks.

Fairfax School District

CONTRACTOR REGISTRATION APPLICATION California Uniform Public Construction Cost Accounting Act

The Fairfax School District has elected to become subject to the California Uniform Public Construction Cost Accounting Procedures. The District is inviting all licensed contractors to submit information for inclusion on the District's list of qualified bidders for the **2025** calendar year.

This notice requires contractors to provide the following information:

- 1) Company name and Tax ID No.
- 2) Contact name and mailing address
- 3) Contact phone number, fax number, and email address
- 4) Type of work contractor is interested in performing
- 5) Type of work contractor is licensed to perform
- 6) Contractor's license class and number
- 7) Department of Industrial Relations (DIR) number

Company Name:		Tax ID No.
Contact Name:	Phone No.:	Fax No:
Mailing Address (Include City, State, Zip):		
Email Address :		
Type of Work:	Contractor License No.	Public Works Registration No.

Information and/or questions should be sent to:

David Mack, Chief Administrator of Business Services Fairfax School District 1500 South Fairfax Road Bakersfield, CA 93307 Phone: 661-366-7221 Fax: 661-366-1901 E-mail: facilities@fairfaxsd.us

The Fairfax School District may create a new contractors list effective January 1st of each year and may include any contractor's name it desires on the contractors list, but must include, at a minimum, all contractors who have properly provided the School District with the required information, either during the calendar year in which the list is valid or during November or December of the prior year. The list will automatically include all contractors who submitted one or more bids to the School District during the preceding year. A contractor may have their firm added to the School District's contractors list at any time by providing the required information.

30-BID QUESTION FORM

PROJECT TITLE: MOT Building RFP# 2023-2314

Date:	Contractor: Address:
Question By:	Fax No.: Phone No.:
QUESTION:	
RESPONSE:	
Date: Answer:	Answered By:
Addendum Required:	YES NO
NOTE: All questions must b Manuel Maldonado [jmaldon	e received by Ordiz-Melby Architects, Inc. Attn.: ado@ordizmelby.com], Alyssa Grishaber

[agrishaber@ordizmelby.com] and Charlene Perry [cperry@ordizmelby.com] in written form via email no later than 06/30/2025 @ 2:00pm. This will allow time to respond to the question and/or issue an addendum to all contractors addressing the question. Questions received after this date will not be acknowledged.

SUMMARY OF WORK SECTION 01 11 00

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

- 1. Provisions set forth in Divisions 0 and 1
- 2. Work by Owner
- 3. Owner Furnished Products
- 4. Work By Others
- 5. Owner Occupancy
- 6. Base Bid Scope of Work.

1.02 WORK BY OWNER

A. Items noted "NIC" (Not in Contract) including, but not limited to moveable cabinets, furnishings, minor equipment, appliances, TVs, projectors, projection screens etc. will be furnished and installed by Owner.

1.03 OWNER FURNISHED PRODUCTS

- A. Owner's Responsibilities:
 - 1. Arrange for and deliver Owner-reviewed shop drawings, product data and samples to Contractor.
 - 2. Arrange and pay for product delivery to site.
 - 3. On delivery, inspect products jointly with Contractor.
 - 4. Submit claims for transportation damage and replace damaged, defective or deficient items.
 - 5. Arrange for manufacturer's warranties, inspections and service.
- B. Contractor's Responsibilities:
 - 1. Review Owner-reviewed shop drawings, product data and samples.
 - 2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
 - 3. Handle, store, install and finish products.
 - 4. Repair or replace items damaged after receipt.
 - 5. Cooperate with Owner to minimize conflict with Owner's rights to occupy substantially completed building(s).

1.04 EXCLUSIONS

- A. The pre-engineered metal building and exterior envelope shall be provided and installed by others, including:
 - a. Pre-engineered metal building, metal siding, roofing, flashing, gutters and trim.
 - b. Roof and Wall insulation finishing system.
 - c. Exterior hollow metal and storefront doors, frames, windows, glazing and hardware including card readers.
 - d. Skylights
 - e. Rollup doors (power for the rollup is within the scope of this bid)
 - f. Metal awnings
- B. The District Office modular building shall be provided and installed by others, including:
 - a. Modular Building
 - b. Foundation, embed plates, vapor control, and under slab utilities to within 5ft of the building exterior.
- C. Procurement of the 1600-amp switchboard shall be by owner (installation and line-side connections are within the scope of this bid.)

1.05 OWNER OCCUPANCY

- A. Partial Occupancy:
 - 1. Owner reserves the right to occupy, place and install equipment as necessary in substantially completed buildings. Cooperate with Owner to minimize conflict and facilitate Owner's operations.
- B. Acceptance of Work:
 - 1. Partial occupancy does not constitute acceptance of work. Refer to General Conditions, Article 53 Contract Closeout and Article 54 Completion.

1.06 BASE BID SCOPE OF WORK

- A. The "Project", of which the "Work" of this contract is a part, is titled "MOT Building".
- B. The "Work" of this contract is defined by the Contract Documents and is defined to include all, but not limited to:
 - a. Site improvements
 - b. Preparation, grading and compaction of building pads.
 - c. Utilities
 - d. MOT Building:
 - i. Foundation
 - ii. Interior improvements within the envelope of the pre-engineered metal building.
 - iii. Plumbing, mechanical, electrical, fire sprinkler, fire alarm and solar.
 - iv. All backing and utilities required to install and operate owner provided equipment.
 - e. District Office:
 - i. Any work not within the building envelope or as described in section 1.04-B.
 - ii. Trellis shade structure.
 - f. Work to be coordinated with the scope of other contractors including:
 - i. Delivery and laydown area of the pre-engineered metal building.
 - ii. Delivery and laydown area for Modular District Office.
- PART 2 PRODUCTS (NOT USED)
- PART 3 EXECUTION (NOT USED)

END OF SECTION 01 11 00

ADMINISTRATIVE REQUIREMENTS

SECTION 01 30 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1
 - 2. General administrative requirements
 - 3. Electronic document submittal service
 - 4. Preconstruction meeting
 - 5. Site mobilization meeting
 - 6. Progress meetings
 - 7. Construction progress schedule
 - 8. Contractor's daily reports
 - 9. Coordination drawings
 - 10. Submittals for review, information, and project closeout
 - 11. Number of copies of submittals
 - 12. Requests for Interpretation (RFI) procedures
 - 13. Submittal procedures
- B. Related Sections:
 - 1. Section 01 60 00 Product Requirements
 - a. General product requirements.
 - 2. Section 01 70 00 Execution and Closeout Requirements
 - a. Additional coordination requirements.

1.02 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Conform to requirements of Section 01 70 00 "Execution and Closeout Requirements" for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to Architect:
 - 1. Requests for Interpretation (RFI)
 - 2. Requests for substitution
 - 3. Shop drawings, product data, and samples
 - 4. Test and inspection reports
 - 5. Design data
 - 6. Manufacturer's instructions and field reports
 - 7. Applications for payment and change order requests
 - 8. Progress schedules
 - 9. Coordination drawings.
 - 10. Correction Punch List and Final Correction Punch List for Notice of Completion.
 - 11. Closeout submittals.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL PROCESS

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an email system.
 - 1. Besides submittals for review, interpretation and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
 - 2. Contractor and Architect are required to use this process.
 - 3. It is Contractor's responsibility to submit documents in allowable format.
 - 4. Subcontractors, suppliers, and Architect's consultants are to be permitted to use the service at no extra charge.
 - 5. Users of the process need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
 - 6. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.
- B. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.02 PRECONSTRUCTION MEETING

- A. Attendance Required:
 - 1. Owner
 - 2. Architect
 - 3. Contractor
- B. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.
 - 4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
 - 5. Designation of personnel representing the parties to Contract, Contractor and Architect.

- 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
- 7. Scheduling.
- C. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.03 SITE MOBILIZATION MEETING

- A. Architect will schedule meeting at the Project site prior to Contractor occupancy.
- B. Attendance Required:
 - 1. Owner
 - 2. Contractor
 - 3. Architect
 - 4. Contractor's superintendent
 - 5. Major subcontractors
- C. Agenda:
 - 1. Use of premises by Owner and Contractor
 - 2. Owner's requirements and occupancy prior to completion
 - 3. Construction facilities and controls provided by Owner
 - 4. Temporary utilities provided by Owner
 - 5. Survey and building layout
 - 6. Security and housekeeping procedures
 - 7. Schedules
 - 8. Application for payment procedures
 - 9. Procedures for testing
 - 10. Procedures for maintaining record documents
 - 11. Requirements for start-up of equipment
 - 12. Inspection and acceptance of equipment put into service during construction period
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the work at maximum bimonthly intervals.

- B. Make arrangements for meetings, prepare agenda with copies for participants and preside at meetings.
- C. Attendance Required:
 - 1. Contractor's Project Manager
 - 2. Owner
 - 3. Architect
 - 4. Contractor's Superintendent.
 - 5. Major subcontractors
- D. Agenda:
 - 1. Review minutes of previous meetings
 - 2. Review of work progress
 - 3. Field observations, problems, and decisions
 - 4. Identification of problems that impede, or will impede, planned progress
 - 5. Review of submittals schedule and status of submittals
 - 6. Maintenance of progress schedule
 - 7. Corrective measures to regain projected schedules
 - 8. Planned progress during succeeding work period
 - 9. Maintenance of quality and work standards
 - 10. Effect of proposed changes on progress schedule and coordination
 - 11. Other business relating to work
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.05 CONSTRUCTION PROGRESS SCHEDULE

- A. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- B. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 - 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- C. Within 10 days after joint review, submit complete schedule.
- D. Submit updated schedule with each Application for Payment.

3.06 DAILY CONSTRUCTION REPORTS

- A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.
- B. Prepare a daily construction report recording the following information concerning events at Project site and project progress:

- 1. Date
- 2. High and low temperatures and general weather conditions
- 3. List of subcontractors at Project site
- 4. List of separate contractors at Project site
- 5. Material deliveries
- 6. Safety, environmental or industrial relations incidents
- 7. Meetings and significant decisions
- 8. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
- 9. Testing and/or inspections performed
- 10. List of verbal instruction given by Owner and/or Architect
- 11. Signature of Contractor's authorized representative

3.07 COORDINATION DRAWINGS

- A. Provide information required by Project Coordinator for preparation of coordination drawings.
- B. Update record drawings on a monthly basis as required as a release for progress payments.
- C. Review drawings prior to submission to Architect.

3.08 REQUESTS FOR INTERPRETATION (RFI)

- A. Definition: A request seeking one of the following:
 - 1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in the Contract Documents.
 - 2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of the Contract Documents. Failure to submit an RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
 - 1. Prepare a separate RFI for each specific item.
 - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
 - b. Do not forward requests which solely require internal coordination between subcontractors.
 - 2. Prepare in a format and with content acceptable to Owner.
 - 3. Prepare using an electronic version of the form appended to this section.
 - 4. Combine RFI and its attachments into a single electronic file. PDF format is preferred.

- C. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
 - 1. Include in each request Contractor's signature attesting to good faith effort to determine from the Contract Documents information requiring interpretation.
 - 2. Unacceptable Uses for RFIs: Do not use RFIs to request the following:
 - a. Approval of submittals (use procedures specified elsewhere in this section).
 - b. Approval of substitutions (see Section 01 60 00 "Product Requirements")
 - 3. Improper RFIs: Requests not prepared in conformance to requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
 - 4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, the Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
- D. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
 - 1. Official Project name and number, and any additional required identifiers established in Contract Documents.
 - 2. Owner's, Architect's, and Contractor's names.
 - 3. Discrete and consecutive RFI number and descriptive subject/title.
 - 4. Issue date and requested reply date.
 - 5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
 - 6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
 - 7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example, routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.
- E. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- F. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
 - 1. Indicate current status of every RFI. Update log promptly and on a regular basis.
 - 2. Note dates of when each request is made, and when a response is received.
 - 3. Highlight items requiring priority or expedited response.
 - 4. Highlight items for which a timely response has not been received to date.
 - 5. Identify and include improper or frivolous RFIs.

- G. Review Time: Architect will respond and return RFIs to Contractor within seven working days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 3:00 PM will be considered as having been received on the following regular working day.
 - 1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.
- H. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
 - 1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
 - 2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
 - 3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
 - 4. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.09 SUBMITTAL SCHEDULE

- A. Submit to Architect for review a schedule for submittals in tabular format.
 - 1. Submit at the same time as the preliminary schedule.
 - 2. Coordinate with Contractor's construction schedule and schedule of values.
 - 3. Format schedule to allow tracking of status of submittals throughout duration of construction.
 - 4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
 - 5. Account for time required for preparation, review, manufacturing, fabrication, and delivery when establishing submittal delivery and review deadline dates.

3.10 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 - 1. Product data.
 - 2. Shop drawings.
 - 3. Samples for selection.
 - 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 70 00 "Execution and Closeout Requirements".

3.11 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 - 1. Design data.
 - 2. Certificates.
 - 3. Test reports.
 - 4. Inspection reports.
 - 5. Manufacturer's instructions.
 - 6. Manufacturer's field reports.
 - 7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner.

3.12 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List.
- B. Submit Final Correction Punch List for Notice of Completion/Owner occupancy.
- C. When the following are specified in individual sections, submit them at project closeout in conformance to requirements of Section 01 70 00 "Execution and Closeout Requirements":
 - 1. Project record documents
 - 2. Operation and maintenance data
 - 3. Warranties
 - 4. Bonds
 - 5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

3.13 NUMBER OF COPIES OF SUBMITTALS

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronicallymarked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
 - 1. After review, produce duplicates.
 - 2. Retained samples will not be returned to Contractor unless specifically so stated.

3.14 SUBMITTAL PROCEDURES

- A. General Requirements:
 - 1. Use a separate transmittal for each item.
 - 2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
 - 3. Transmit using approved form.
 - a. Use form included at the end of this Section.
 - 4. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
 - 5. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
 - 6. <u>Apply Contractor's stamp, signed or initialed</u> certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
 - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
 - 7. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties and is of the benefit to the project.
 - a. Upload submittals in electronic form per Electronic Document Submittal process.
 - 8. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - a. For each submittal for review, allow 21 calendar days excluding delivery time to and from the Contractor.
 - b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
 - 9. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
 - 10. Provide space for Contractor and Architect review stamps.
 - 11. When revised for resubmission, identify all changes made since previous submission.
 - 12. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.

- 13. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
- 14. Submittals not requested will be recognized, and will be returned "Not Reviewed".
- B. Product Data Procedures:
 - 1. Submit only information required by individual specification sections.
 - 2. Collect required information into a single submittal.
 - 3. Submit concurrently with related shop drawing submittal.
 - 4. Do not submit (Material) Safety Data Sheets for materials or products.
- C. Shop Drawing Procedures:
 - 1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related work.
 - 2. <u>Do not reproduce the Contract Documents</u> to create shop drawings.
 - 3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
- D. Samples Procedures:
 - 1. Transmit related items together as single package.
 - 2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

3.15 SUBMITTAL REVIEW

- A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.
- B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.
- C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
- D. Architect's and his consultants' actions on items submitted for review:
 - 1. Authorizing purchasing, fabrication, delivery, and installation:
 - a. "Reviewed" or language with same legal meaning.
 - b. "Reviewed and Corrected" resubmission not required, or language with same legal meaning.
 - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.

- 2. Not-Authorizing fabrication, delivery, and installation.
 - a. "Revise and Resubmit", or language with same legal meaning.
 - b. "Not Acceptable" or language with same legal meaning.
- E. Architect's and his consultants' actions on items submitted for information:
 - 1. Items for which no action was taken:
 - a. "Received" to notify the Contractor that the submittal has been received for record only.
 - 2. Items for which action was taken:
 - a. "Reviewed" no further action is required from Contractor.

END OF SECTION 01 30 00

QUALITY REQUIREMENTS **SECTION 01 40 00**

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Submittals
 - 2. Quality assurance
 - 3. References and standards
 - 4. Testing and inspection agencies and services
 - 5. Control of installation
 - 6. Tolerances
 - 7. Defect Assessment

B. Related Sections:

- 1. Section 01 30 00: Administrative Requirements a. Submittal procedures.
- 2. Section 01 42 16: Definitions.
- Section 01 42 19:
 Section 01 60 00: Reference Standards.
- **Product Requirements**
 - a. Requirements for material and product quality.

1.02 REFERENCE STANDARDS

- A. ASTM C1021 Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2014).
- B. ASTM C1077 Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2016
- C. ASTM D3740 Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.
- D. ASTM E329 Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2014a.
- E. ASTM E543 Standard Specification for Agencies Performing Nondestructive Testing; 2015.
- F. IAS AC89 Accreditation Criteria for Testing Laboratories; 2010.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.
- C. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of test/inspection.
 - h. Date of test/inspection.
 - i. Results of test/inspection.
 - j. Conformance with Contract Documents.
 - k. When requested by Architect, provide interpretation of results.
- D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
 - 1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 - 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.
- E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- F. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.
 - 1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
 - 2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

1.04 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Obtain copies of standards where required by product specification sections.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until the Notice of Completion.
- E. Should specified reference standards conflict with Contract Documents, the Contractor shall request clarification from Architect before proceeding.
- F. Neither the contractual relationships, duties nor responsibilities of the parties in the Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.05 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. Owner will employ and pay for services of an independent testing agency to perform other specified testing.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, the Contractor shall request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

- E. Have Work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, the Contractor shall request clarification from Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

3.03 TESTING AND INSPECTION

- A. Testing Agency Duties:
 - 1. Test samples of mixes submitted by Contractor.
 - 2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 - 3. Perform specified sampling and testing of products in accordance with specified standards.
 - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 5. Promptly notify Architect and Contractor of observed irregularities or nonconformance of Work or products.
 - 6. Perform additional tests and inspections required by Architect.
 - 7. Attend preconstruction meetings and progress meetings.
 - 8. Submit reports of all tests/inspections specified.
- B. Limits on Testing/Inspection Agency Authority:
 - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency may not approve or accept any portion of the Work.
 - 3. Agency may not assume any duties of Contractor.
 - 4. Agency has no authority to stop the Work.
- C. Contractor Responsibilities:
 - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.

- 2. Cooperate with laboratory personnel and provide access to the Work and to manufacturers' facilities.
- 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
- 4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
- 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- 6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- D. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.
- E. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

3.04 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements.

END OF SECTION 01 40 00

REGULATORY REQUIREMENTS SECTION 01 41 00

PART 1 GENERAL

1.01 GOVERNING AGENCY

- A. The governing agencies having review over this project are as follows:
 - 1. County of Kern:
 - a. Building Department
 - b. Fire Department
 - c. Environmental Health Services Department (food service and septic tank permits).
 - 2. State Fire Marshal

1.02 LAWS AND REGULATIONS

- A. The project shall be constructed under the jurisdiction of all laws of the State of California governing the construction of public buildings including:
 - 1. California Code of Regulations, Title 8.
 - 2. California Code of Regulations, Title 19, Public Safety, State Fire Marshal Regulations.
 - 3. California Code of Regulations, Title 24:
 - a. 2022 California Building Standards Administrative Code (Part 1).
 - b. 2022 California Building Code Volumes 1 and 2 (Part 2).
 - c. 2022 California Electrical Code (Part 3).
 - d. 2022 California Mechanical Code (Part 4).
 - e. 2022 California Plumbing Code (Part 5).
 - f. 2022 California Energy Code (Part 6).
 - g. 2022 California Fire Code (Part 9).
 - h. 2022 Existing Building Code (Part 10).
 - i. 2022 California Green Building Standards Code (Part 11);
 - j. 2022 California Referenced Standards Code, Title 24 C.C.R. (Part 12)
 - 4. 2022 NFPA 13, Installation of Fire Sprinkler Systems, California amended.
 - 5. 2019 NFPA 14, Installation of Standpipe and Hose Systems
 - 6. 2021 NFPA 17, Dry Chemical Extinguishing Systems
 - 7. 2021 NFPA 17A, Wet Chemical Extinguishing Systems
 - 8. 2013 NFPA 25, Inspection, Testing, Maintenance of Water-Based Fire Protection Systems, California amended.
 - 9. 2022 NFPA 72, National Fire Alarm Code, California amended. See UL Std. 1971 for "Visual Devices."
 - 10.2019 NFPA 80 Fire Door and Other Opening Protectives.
 - 11.2019 NFPA 253 Critical Radiant Flux of Floor Covering Systems.
 - 12.2018 NFPA 2001 Clean Agent for Fire Extinguishing Systems.
 - 13. Occupational Health and Safety Act.
 - 14. Interpretive Manuals, Code Rules, and Safety Orders of:

- a. State Fire Marshal.
- b. Division of the State Architect.
- c. Division of Industrial Safety.
- d. Department of Industrial Relations.
- e. Other Agencies.
- 15. San Joaquin Valley Air Quality Management District
- B. Nothing in the plans or specifications is to be construed to permit work not in conformance with any applicable code or regulation.
- C. Other Regulatory Requirements and General Conditions:
 - 1. T-24, Parts 1-12 (as applicable) must be kept on site during construction.
 - 2. If any conflicts or inconsistencies exist between the specifications and the drawings (including the General Notes), the drawings and General Notes shall take precedence.
 - 3. All Addenda must be signed by the Architect and approved by the Division of the State Architect (Section 4-338, Part 1) or local authority.
 - 4. All substitutions affecting DSA regulated items shall be considered as a Construction Change Document (CCD) or Addenda and shall be approved by DSA prior to fabrication and installation. (IR A-6 and Section 4-338(c), Part 1.
 - 5. The Construction Change Documents must be signed by the owner and approved by the following:
 - a. Architect/Engineer of Record
 - b. Structural Engineer (when applicable)
 - c. Delegated professional engineer (when applicable)
 - d. DSA
- D. The Project Inspector and testing lab must be employed by the owner and approved by the following:
 - 1. Architect/Engineer of Record
 - 2. Structural Engineer (when applicable)

PART 2 PRODUCT – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION 01 41 00

DEFINITIONS SECTION 01 42 16

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. This section supplements the definitions contained in the General Conditions.
 - 2. Other definitions are included in individual specification sections.

1.02 DEFINITIONS

- A. Furnish: To supply, deliver, unload, and inspect for damage.
- B. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.
- C. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never used, or re-used materials or equipment.
- D. Project Manual: The book-sized volume that includes the procurement requirements (if any), the contracting requirements, and the specifications.
- E. Provide: To furnish and install.
- F. Supply: Same as Furnish.
- PART 2 PRODUCTS NOT USED
- PART 3 EXECUTION NOT USED

END OF SECTION 01 42 16

REFERENCE STANDARDS SECTION 01 42 19

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Requirements relating to referenced standards.
 - 2. Reference standards full title and edition date.

1.02 QUALITY ASSURANCE

- A. For products or workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue specified in this section, except where a specific date is established by applicable code.
- C. Obtain copies of standards when required by the Contract Documents.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Date of Notice of Completion.
- E. Should specified reference standards conflict with Contract Documents, the Contractor shall request clarification from the Architect before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Architect shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

1.03 CONSTRUCTION INDUSTRY ORGANIZATION DOCUMENTS

- A. AAMA -- AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION
 - 1. AAMA/WDMA/CSA 101/I.S.2/A440 North American Fenestration Standard/Specification for windows, doors, and skylights; 2011.
 - 2. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).
 - 3. AAMA 1503 Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
 - 4. AAMA 2605 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2013.
 - 5. AAMA CW-10 Care and Handling of Architectural Aluminum from Shop to Site; 2015.

- B. ACI -- AMERICAN CONCRETE INSTITUTE INTERNATIONAL
 - 1. ACI 117 Standard Specifications for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).
 - 2. ACI 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 2022.
 - 3. ACI 211.2 Standard Practice for Selecting Proportions for Structural Lightweight Concrete; 1998.
 - 4. ACI 214R Guide to Evaluation of Strength Test Results of Concrete; 2011.
 - 5. ACI 301 Specifications for Structural Concrete; 2020.
 - 6. ACI 302.1R Guide for Concrete Floor and Slab Construction; 2015.
 - 7. ACI 304R Guide for Measuring, Mixing, Transporting, and Placing Concrete; Reapproved 2009.
 - 8. ACI 305R Guide to Hot Weather Concreting; 2020.
 - 9. ACI 306R Cold Weather Concreting; 2016.
 - 10. ACI 306.1 Cold Weather Concreting; 1990 (Reapproved 2002).
 - 11. ACI 308R Guide to Curing Concrete; 2016.
 - 12. ACI 309R Guide for Consolidation of Concrete; 2005.
 - 13. ACI 318 Building Code Requirements for Structural Concrete; 2019.
 - 14. ACI 347R Guide to Formwork for Concrete; 2014.
 - 15. ACI SP-66 Details and Detailing of Concrete; 2004.
- C. AISC -- AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC.
 - 1. AISC 303 Code of Standard Practice for Steel Buildings and Bridges; 2016.
- D. ANSI -- AMERICAN NATIONAL STANDARDS INSTITUTE
 - 1. ANSI A108/A118/A136.1 American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2017.
 - 2. ANSI A135.4 American National Standard for Basic Hardboard; 2012.
 - 3. ANSI A137.1 American National Standard Specifications for Ceramic Tile; 2019.
 - 4. ANSI A208.1 American National Standard for Particleboard; 2009.
 - 5. ANSI Z97.1 American National Standard for Safety Glazing Materials Used in Buildings Safety Performance Specifications and Methods of Test; 2015.
- E. ASTM INTERNATIONAL
 - 1. ASTM A1 Standard Specification for Carbon Steel Tee Rails; 2000 (Reapproved 2010).
 - 2. ASTM A6/A6M Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling; 2017.
 - 3. ASTM A36/A36M Standard Specification for Carbon Structural Steel; 2014.
 - 4. ASTM A48/A48M Standard Specification for Gray Iron Castings; 2003
 - 5. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
 - 6. ASTM A82 Standard Specification for Steel Wire, Plain for Concrete; 2002.
 - 7. ASTM A108 Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished; 2013.
 - 8. ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized)

Coatings on Iron and Steel Products; 2015.

- 9. ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- 10. ASTM A184/A184M Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement; 2019.
- 11. ASTM A242/A242M Standard Specification for High-Strength Low-Alloy Structural Steel; 2013.
- 12. ASTM A283/A283M Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.
- 13. ASTM A307 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.
- 14. ASTM A424/A424M Standard Specification for Steel, Sheet, for Porcelain Enameling; 2009a (Reapproved 2016).
- 15. ASTM A449 Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use; 2014.
- 16. ASTM A497A/A497M Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete; 2002.
- 17. ASTM A500/A500M Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- 18. ASTM A501/A501M Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.
- 19. ASTM A514/A514M Standard Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding; 2014.
- 20. ASTM A529/A529M Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality; 2014.
- 21. ASTM A563 Standard Specification for Carbon and Alloy Steel Nuts; 2015.
- 22. ASTM A563M Standard Specification for Carbon and Alloy Steel Nuts (Metric); 2007 (Reapproved 2013).
- 23. ASTM A572/A572M Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2018.
- 24. ASTM A588/A588M Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi (345 MPa) Minimum Yield Point, with Atmospheric Corrosion Resistance; 2015.
- 25. ASTM A615/A615M Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2015.
- 26. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.
- 27. ASTM A666 Standard Specification for Annealed or Cold-Worked Austenitic Stainless-Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- 28. ASTM A704A/A704M Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement; 2017.
- 29. ASTM A706A/A706M Standard Specification for Deformed and Plain Lowalloy Steel Bars for Concrete Reinforcement; 2016.
- 30. ASTM A759 Standard Specification for Carbon Steel Crane Rails; 2010

(Reapproved 2016).

- 31. ASTM A884/A884M Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2014.
- 32. ASTM A992/A992M Standard Specification for Structural Steel Shapes; 2011 (Reapproved 2015).
- 33. ASTM A996/A996M Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement; 2016.
- 34. ASTM A1008/A1008M Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2016.
- 35. ASTM A1011/A1011M Standard 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; 2015.
- 36. ASTM A1064/A1064M Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2017.
- 37. ASTM B32 Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- 38. ASTM B117 Standard Practice for Operating Salt Spray (Fog) Apparatus; 2016.
- 39. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- 40. ASTM B221M Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
- 41. ASTM B633 Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
- 42. ASTM C31/C31M Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2018.
- 43. ASTM C33/C33M Standard Specification for Concrete Aggregates; 2018.
- 44. ASTM C39/C39M Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2016b.
- 45. ASTM C40 Standard Test Method for Organic Impurities in Fine Aggregates for Concrete; 2004.
- 46. ASTM C42/C42M Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete; 2020.
- 47. ASTM C87 Standard Test Method for Effect of Organic Impurities in Fine Aggregate on Strength of Mortar; 2005.
- 48. ASTM C88 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate; 2013.
- 49. ASTM C94/C94M Standard Specification for Ready-Mixed Concrete; 2016a.
- 50. ASTM C109/C109M Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2016a.
- 51. ASTM C128 Standard Test Method for Relative Density (Specific Gravity) and Absorption of Fine Aggregate; 2022.
- 52. ASTM C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2006.
- 53. ASTM C138/C138M Standard Test Method for Density (Unit Weight), Yield,

and Air Content (Gravimetric) of Concrete; 2017.

- 54. ASTM C140/C140M Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units; 2018.
- 55. ASTM C143/C143M Standard Test Method for Slump of Hydraulic-Cement Concrete; 2015a.
- 56. ASTM C150/C150M Standard Specification for Portland Cement; 2018.
- 57. ASTM C157 Standard Test Method for Length Change of Hardened Cement Mortar and Concrete; 1975.
- 58. ASTM C171 Standard Specification for Sheet Materials for Curing Concrete; 2020.
- 59. ASTM C172 Standard Practice for Sampling Freshly Mixed Concrete; 2017.
- 60. ASTM C173/C173M Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2016.
- 61. ASTM C231 Standard Test Method for air Content of Freshly Mixed Concrete by the Pressure Method; 2009.
- 62. ASTM C260/C260M Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).
- 63. ASTM C295 Standard Guide for Petrographic Examination of Aggregates for Concrete; 2008.
- 64. ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2019.
- 65. ASTM C330 Standard Specification for Lightweight Aggregates for Structural Concrete; 2017.
- 66. ASTM C332 Standard Specification for Lightweight Aggregates for Insulating Concrete; 2017.
- 67. ASTM C373 Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products; 2016e1.
- 68. ASTM C404 Standard Specification for Aggregates for Masonry Grout; 2018.
- 69. ASTM C426 Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units; 2016.
- 70. ASTM C475/C475M Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017.
- 71. ASTM C494/C494M Standard Specification for Chemical Admixtures for Concrete; 2016.
- 72. ASTM C495 Standard Test method for Compressive Strength of Lightweight Insulating Concrete; 2007.
- 73. ASTM C501 Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser; 1984 (Reapproved 2015).
- 74. ASTM C514 Standard Specification for Nails for the Application of Gypsum Board; 2004 (Reapproved 2014).
- 75. ASTM C567 Standard Method for Determining Density of Structural Lightweight Concrete; 2019.
- 76. ASTM C618 Standard Specification for Coal Fly Ash and Raw or Calcined

Natural Pozzolan for Use in Concrete; 2015.

- 77. ASTM C635/C635M Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.
- 78. ASTM C636/C636M Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.
- 79. ASTM C685/C685M Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2014.
- 80. ASTM C779/C779M Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces; 2012.
- 81. ASTM C794 Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2015a.
- 82. ASTM C805 Standard Test Method for Rebound Number of Hardened Concrete; 2002.
- 83. ASTM C827/C827M Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures; 2016.
- 84. ASTM C834 Standard Specification for Latex Sealants; 2014.
- 85. ASTM C840 Standard Specification for Application and Finishing of Gypsum Board; 2018.
- 86. ASTM C864 Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2015).
- 87. ASTM C881/C881M Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2020.
- 88. ASTM C903 Standard Practice for Preparing Refractory Specimens by Cold Gunning; 2015.
- 89. ASTM C920 Standard Specification for Elastomeric Joint Sealants; 2018.
- 90. ASTM C979/C979M Standard Specification for Pigments for Integrally Colored Concrete; 2013.
- 91. ASTM C1002 Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2018.
- 92. ASTM C1019 Standard Test Method for Sampling and Testing Grout for Masonry; 2016.
- 93. ASTM C1028 Standard Test method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surface by the Horizontal Dynamometer Pull-Meter Method; 2006.
- 94. ASTM C1036 Standard Specification for Flat Glass; 2016.
- 95. ASTM C1048 Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- 96. ASTM C1059/C1059M Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2013.
- 97. ASTM C1087 Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2016.
- 98. ASTM C1107/C1107M Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014a.
- 99. ASTM C1155 Standard Practice for Determining Thermal Resistance of

Building Envelope Components from the In-Situ Data; 2021.

- 100. ASTM C1193 Standard Guide for Use of Joint Sealants; 2016.
- 101. ASTM C1248 Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).
- 102. ASTM C1280 Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing; 2013a.
- 103. ASTM C1311 Standard Specification for Solvent Release Sealants; 2014.
- ASTM C1315 Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete; 2019.
- 105. ASTM C1363 Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus; 2011.
- 106. ASTM C1376 Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2015.
- 107. ASTM C1396/C1396M Standard Specification for Gypsum Board; 2017.
- 108. ASTM C1586 Standard Guide for Quality Assurance of Mortars; 2005 (Reapproved 2011).
- 109. ASTM C1658/C1658M Standard Specification for Glass Mat Gypsum Panels; 2018.
- 110. ASTM D16 Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.
- 111. ASTM D226/D226M Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017.
- 112. ASTM D523 Standard Test Method for Specular Gloss; 2014.
- 113. ASTM D543 Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents; 2014.
- 114. ASTM D570 Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).
- 115. ASTM D638 Standard Test Method for Tensile Properties of Plastics; 2014.
- 116. ASTM D695 Standard Test Method for Compressive Properties of Rigid Plastics; 2015.
- 117. ASTM D714 Standard Test Method for Evaluating Degree of Blistering of Paints; 2002 (Reapproved 2009).
- 118. ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2016.
- 119. ASTM D822/D822M Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings; 2013.
- 120. ASTM D994/D994M Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type); 2011 (Reapproved 2016).
- 121. ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³); 2012.
- 122. ASTM D1654 Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments; 2008.
- 123. ASTM D1751 Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types); 2004 (Reapproved 2013).
- 124. ASTM D1752 Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2013).
- 125. ASTM D2047 Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine; 2011.
- 126. ASTM D2103 Standard Specification for Polyethylene Film and Sheeting; 2015.
- 127. ASTM D2178/D2178M Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing; 2015a.
- 128. ASTM D2240 Standard Test Method for Rubber Property--Durometer Hardness; 2015.
- 129. ASTM D2244 Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates; 2016.
- 130. ASTM D2794 Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact) ; 1993 (Reapproved 2010).
- 131. ASTM D2859 Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2016.
- 132. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
- 133. ASTM D3359 Standard Test Method for Measuring Adhesion by Tape Test; 2009.
- 134. ASTM D4442 Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2015.
- 135. ASTM D4586/D4586M Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2018).
- 136. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2018B.
- 137. ASTM E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- 138. ASTM E94 Standard Guide for Radiographic Examination; 2004 (Reapproved 2010).
- 139. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- 140. ASTM E108 Standard Test Methods for Fire Tests of Roof Coverings; 2017.
- 141. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials; 2018B.
- 142. ASTM E154/E154M Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover; 2008a (Reapproved 2013).
- 143. ASTM E164 Standard Practice for Contact Ultrasonic Testing of

Weldments; 2013.

- 144. ASTM E165/E165M Standard Test Method for Liquid Penetrant Examination for General Industry; 2012.
- 145. ASTM E283 Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- 146. ASTM E329 Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Testing; 2021.
- 147. ASTM E331 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).
- 148. ASTM E413 Classification for Rating Sound Insulation; 2016.
- 149. ASTM E580/E580M Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2017.
- 150. ASTM E648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2017A.
- 151. ASTM E709 Standard Guide for Magnetic Particle Testing; 2015.
- 152. ASTM E1105 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.
- 153. ASTM E1155 Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers; 2020.
- 154. ASTM E1264 Standard Classification for Acoustical Ceiling Products; 2014.
- 155. ASTM E1300 Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.
- 156. ASTM E1592 Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference; 2005 (Reapproved 2017).
- 157. ASTM E1643 Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2011.
- 158. ASTM E1646 Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference; 1995 (Reapproved 2011).
- 159. ASTM E1680 Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems; 2011.
- 160. ASTM E1745 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.

- 161. ASTM E1996 Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes; 2017.
- 162. ASTM E2190 Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
- 163. ASTM F436/F436M Standard Specification for Hardened Steel Washers Inch and Metric Dimensions; 2016.
- 164. ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- 165. ASTM F959 Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners; 2013.
- 166. ASTM F1066 Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2014).
- 167. ASTM F1292 Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment; 2004.
- 168. ASTM F1487 Standard Consumer Safety Performance Specification for Playground Equipment for Public Use; 2001.
- 169. ASTM F1554 Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2015.
- 170. ASTM F1861 Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).
- 171. ASTM F1951 Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment; 1999.
- 172. ASTM F2408 Standard Specification for Ornamental Fences Employing Galvanized Steel Tubular Pickets; 2016.
- ASTM F3125/F3125M Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.
- 174. ASTM G23 Standard Practice for Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetalic Materials; 1981.
- 175. ASTM G155 Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2013.
- F. AWS -- AMERICAN WELDING SOCIETY
 - 1. AWS A2.4 Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
 - 2. AWS D1.1/D1.1M Structural Welding Code Steel; 2015.
 - 3. AWS D1.2/D1.2M Structural Welding Code Aluminum; 2014.
 - 4. AWS D1.4/D1.4M Structural Welding Code Reinforcing Steel; 2018.
 - 5. AWS D1.8/D1.8M Structural Welding Code Seismic Supplement; 2016.
- G. BHMA -- BUILDERS HARDWARE MANUFACTURERS ASSOCIATION
 - 1. BHMA A156.9 American National Standard for Cabinet Hardware; 2015.

- H. CDA -- COPPER DEVELOPMENT ASSOCIATION, INC.
 1. CDA A4050 Copper in Architecture Handbook; current edition.
- I. CRI -- CARPET AND RUG INSTITUTE
 - 1. CRI 104 Standard for Installation of Commercial Carpet; 2015.
 - 2. CRI (GLP) Green Label Plus Testing Program Certified Products; www.carpet-rug.org; current edition.
- J. FM -- FACTORY MUTUAL GLOBAL
 - 1. FM (AG) FM Approval Guide; current edition.
- K. GA -- GYPSUMASSOCIATION
 - 1. GA-216 Application and Finishing of Gypsum Board; 201.
- L. GANA -- GLASS ASSOCIATION OF NORTH AMERICA
 - 1. GANA (GM) GANA Glazing Manual; 2009.
 - 2. GANA (SM) GANA Sealant Manual; 2008.
- M. IAS -- INTERNATIONAL ACCREDITATION SERVICE
 - 1. IAS AC172 Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc; 2017.
- N. IGMA -- INSULATING GLASS MANUFACTURERS ALLIANCE
 - 1. IGMA TM-3000 North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use; 1990 (2004).
- O. ITS -- INTERTEK TESTING SERVICES NA, INC.1. ITS (DIR) Directory of Listed Products; current edition.
- P. MPI -- MASTER PAINTERS INSTITUTE (MASTER PAINTERS AND DECORATORS ASSOCIATION)
 - 1. MPI (APSM) Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.
- Q. NEMA -- NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
 1. NEMA LD 3 High-Pressure Decorative Laminates; 2005.
- R. NFPA -- NATIONAL FIRE PROTECTION ASSOCIATION
 - 1. NFPA 10 Standard for Portable Fire Extinguishers; 2021.
 - 2. NFPA 241- Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022.
 - 3. NFPA 252 Standard Methods of Fire Tests of Door Assemblies; 2017.
 - 4. NFPA 253 Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2019.
 - 5. NFPA 286 Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2015.

- S. NFRC -- NATIONAL FENESTRATION RATING COUNCIL, INC.
 - 1. NFRC 100 Procedure for Determining Fenestration Product U-factors; 2014.
 - 2. NFRC 200 Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2014.
 - 3. NFRC 300 Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2014.
- T. RCSC -- RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS
 - 1. RCSC (HSBOLT) Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections; 2014, with April 2015 Errata.
- U. SMACNA -- SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION, INC.
 - 1. SMACNA (ASMM) Architectural Sheet Metal Manual; 2012.
- V. SSPC -- SOCIETY FOR PROTECTIVE COATINGS
 - 1. SSPC-Paint 15 Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
 - SSPC-Paint 20 Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic");
 - 2002 (Ed. 2004).
 - 3. SSPC-SP 1 Solvent Cleaning; 2015.
 - 4. SSPC-SP 2 Hand Tool Cleaning; 1982 (Ed. 2004).
 - 5. SSPC-SP 3 Power Tool Cleaning; 1982 (Ed. 2004).
 - 6. SSPC-SP 5 White Metal Blast Cleaning; 2007.
 - 7. SSPC-SP 6 Commercial Blast Cleaning; 2007.
 - 8. SSPC-SP 7 Brush-Off Blast Cleaning; 2007.
 - 9. SSPC-SP 10 Near-White Blast Cleaning; 2007.
 - 10. SSPC-SP 11 Power Tool Cleaning to Bare Metal; 2012 (Ed. 2013).
 - 11. SSPC-SP 13 Surface Preparation of Concrete; (Reaffirmed 2015); 2003.
- W. SWRI -- SEALANT, WATERPROOFING AND RESTORATION INSTITUTE
 - 1. SWRI (VAL) SWR Institute Validated Products Directory; Current Listings at www.swrionline.org.
- X. TCNA -- TILE COUNCIL OF NORTH AMERICA, INC.
 - 1. TCNA (HB) Handbook for Ceramic, Glass, and Stone Tile Installation; 2024.
- Y. UL -- UNDERWRITERS LABORATORIES INC.
 - 1. UL (DIR) Online Certifications Directory; Current listings at database.ul.com.
 - 2. UL (FRD) Fire Resistance Directory; current edition.
 - 3. UL 10B Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
 - 4. UL 10C Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

- 5. UL 263 Standard for Fire Tests of Building Construction and Materials; Current Edition, Including All Revisions.
- Z. WI -- WOODWORK INSTITUTE
 - 1. WI (CCP) Certified Compliance Program (CCP); current edition at www.woodworkinstitute.com.
 - 2. WI (MAN) Manual of Millwork; 2024.

1.04 UNITED STATES GOVERNMENT AND RELATED AGENCIES DOCUMENTS

- A. UNITED STATES CODE
 - 1. Title 7, United States Code, 136 through 136y Federal Insecticide, Fungicide and Rodenticide Act; 1947 (Revised 2001).
- B. CFR -- CODE OF FEDERAL REGULATIONS
 - 1. ADA Standards Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
 - 2. CFR 1191 Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
 - 3. CFR 37 Transportation Services for Individuals with Disabilities (ADA); current edition.
- C. ATBCB -- US ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE BOARD (THE ACCESS BOARD)
 - 1. ATBCB PROWAG Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way; 2011.
- D. PS -- PRODUCT STANDARDS
 - 1. PS 1 Structural Plywood; 2009.
 - 2. PS 2 Performance Standard for Wood-Based Structural-Use Panels; 2010.
 - 3. PS 20 American Softwood Lumber Standard; 2015.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 42 19

TESTS AND INSPECTIONS SECTION 01 45 23

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1
 - 2. Tests and inspections of materials
 - a. Earthwork:
 - 1) Inspection of sub-grade improvement operations, compacted fill, and field density tests.
 - b. Concrete Work:
 - 1) Testing and certification of concrete ingredients, compression cylinders, reinforcing steel, and placement inspections.
 - c. Structural Steel:
 - 1) Sampling and testing of required specimens, inspection of structural fabrication, shop welding, and field welding as required.
 - d. Wood:
 - 1) Lumber and Plywood:
 - a) Materials shall be per 2022 California Building Code, Section 2303.1.

1.02 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Conform to local authority having jurisdiction (County or City).

1.03 SPECIAL PROVISIONS

- A. The laboratory shall be approved by Owner, Architect, Structural Engineer, and local authority having jurisdiction (County or City).
- B. The laboratory shall be in the employ of the Owner.
- C. Duties of Testing Laboratory:
 - 1. Inspect stock, mark identified stock, select and mark test specimens, perform required tests, inspections as specified, furnish required reports and certificates.
- D. Reports:
 - 1. Reports are to be executed immediately upon conclusion of each procedure and forwarded to:
 - a. Architect
 - b. Structural Engineer
 - c. Construction Manager
 - d. Contractor
 - e. Owner

- f. Subcontractor
- g. Project Inspector
- 2. Payment:
 - a. The Owner shall pay for all tests, except the costs of concrete mix design.
 - b. When in the opinion of the Architect, additional tests are required, then such tests and inspection shall be paid for by the Owner, but the amount paid shall be deducted from the Contract Price.
 - c. Examples of such additional tests are:
 - Tests of material substituted for previously accepted materials, unidentified materials, re-tests made necessary by the failure of materials to comply with the requirements of the specifications, and load tests necessary because certain portions of the structure have not fully met specification or plan requirements.
- 3. Selection of Samples:
 - a. All samples and specimens for testing shall be selected by the inspector or by the testing laboratory, but not by the Contractor.
 - b. The Contractor shall, at his own expense, furnish, package, mark, and deliver all samples to be tested, when so directed by the inspector, testing laboratory, or as required by the specifications.
 - c. Delivery of samples to the testing laboratory shall be made in ample time to allow tests to be made without delaying construction.
 - d. No extra time will be allowed for the completion of the work by reason of a delay in testing samples.
 - e. The Contractor shall allow free access at all times to the representatives of the testing laboratory to the sources from which samples are taken.
- 4. Preparation of Specimens:
 - a. Taken by, and at expense of fabricator, under direction of testing laboratory and machined or prepared to conform to appropriate ASTM specification.
 - b. The cost of machining specimens is considered part of the testing.
- 5. Architect and Structural Engineer reserve the right to demand for test and special examination of any materials, or part thereof, to ensure compliance with specifications, and may reject for satisfactory replacement, any material, or part judged defective, as a result thereof.
 - a. This also applies to materials or sources of same substituted for those previously approved.
 - b. Such tests or examinations, even though not specified, shall be performed as and when required.
 - c. Costs paid for by Owner, but the amount paid shall be deducted from the Contract.
- 6. Owner's Right to Waive Tests and Inspections:
 - a. The Owner reserves the right to waive any part, or all of the tests and inspections, subject to the approval of the Architect, Structural Engineer, and the authority having jurisdiction.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

1.01 SEQUENCING AND SCHEDULING

- A. Coordinate work with that of other trades in time to avoid delays to the overall work progress.
- B. The laboratory shall cooperate with all trades whose work affects or is affected by the tests and inspections.
- C. Contractor to cooperate with and provide testing laboratory opportunity and assistance in taking samples, making field tests, and making inspections.

1.02 TESTS AND INSPECTIONS

A. All special inspections shall conform to the requirements of Chapter 17A of Title 24, Part 2, California Building Code (CBC) 2022.

1.03 EARTHWORK (Refer to Section 31 22 00 "Earthwork")

- A. Excavations and Foundations:
 - 1. Chapter 17A:
 - a. Inspections:
 - 1) Earth fill compactions: 1705A.6 and Table 1705A.6
 - 2. Testing Agency:
 - a. Any required foundation consultation, examination, or testing shall be done by an approved Foundation Engineer.
 - b. Costs paid by Owner.
- B. Consultation or Procedures for this part of the work shall be only as requested by the Architect and Structural Engineer at the time work on the site is commenced and may consist of the following:
 - 1. Examination of building sub-grade resulting from the cutting operation, including field density tests if considered necessary.
 - 2. Verify completed foundation excavations.
 - 3. Periodic inspection of any required filling and backfilling, including field density tests if considered necessary.
 - 4. Imported or Native Fill Material: Approved material, perform suitability tests for compaction, qualities, and optimum moisture if required.
 - 5. Provide Continuous Inspection Supervision during removal and re-compaction of existing soil and placement of fill.
 - 6. Inspect and approve completed footing excavations.
 - 7. Field Density Tests shall be made on samples from material in place as required to verify proper compaction densities of fills and backfills.
- C. Densities and Method:
 - 1. Densities specified relate to ASTM Designation D1557 Procedure A.

- D. Tests
 - 1. The initial testing shall be paid for by the Owner. If the compaction test results are less than the specified amount, the compaction shall be deemed unacceptable. The earthwork shall be reworked and retested. The Contractor shall pay all costs of these core tests.

1.04 CONCRETE WORK (Refer to Section 03 31 00 "Structural Concrete Work")

- A. Inspections:
 - 1. Batch Plant or Weighmaster Inspection: 1705A.3.3.
 - 2. Reinforcing Bar Welding Inspection: 1705A.3.1 and 1705A.2.5.
 - 3. Notification:
 - a. The Contractor shall notify the following people, giving advance notice prior to commencing the designated work:
 - 1) Person Notified: Architect and Construction Manager
 - a) Advance Notice: Two Business Days
 - b) Prior to Commencing: Form Work
 - c) For Inspection: Excavation
 - 2) Person Notified: Architect, Construction Manager, and Inspector
 - a) Advance Notice: Two Business Days
 - b) Prior to Commencing: Pouring Concrete
 - c) For Inspection: Forms and Steel
 - 3) Person Notified: Governing Agency
 - a) Advance Notice: Three Business Days
 - b) Advance Notice: Three Business Days
 - c) For Inspection: Forms and Steel
 - 4. Bonded Weighmaster Certificates
 - a. Non-structural concrete such as floor slabs on grade, walks, curb & gutter, etc., shall not require continuous batch plant inspection, but instead, a bonded weighmaster shall furnish notarized affidavits certifying that quantities and quality of all materials used in the concrete instead, a bonded weighmaster shall furnish notarized affidavits certifying that quantities and quality of all materials used in the concrete are in accordance with these specifications and the approved mix design.
 - 5. Batch Plant Inspections: When transit mixed concrete is used, continuous inspection shall be maintained at the plant by a qualified concrete technician who shall issue tickets certifying that quantities and quality of all materials used in the concrete are in accordance with these specifications and the approved design mix.
 - a. The Owner will pay the costs of this inspection.
 - b. This inspection will not be required for non-structural concrete as indicated in C.B.C. Section 1705A.3.
 - 6. No concrete shall be poured except in the presence of the Owner's Inspector and only after the forms and reinforcing steel have been approved by the Architect or his representative.

B. Tests:

- 1. All concrete materials to be tested and reported prior to any use of same.
- 2. Cementitious materials and limits on shall conform to the requirements of ACI 318, CBC Sections 1903A and 1903A.6, and ASTM C150.
 - a. One sample shall be taken for each 100 tons of cement, except that when used in bulk loading ready mix plants where separate bins for pre-tested cement are not available, grab samples shall be taken for each shipment of cement placed in the bin with not less than one sample being taken for each day's pour and such samples shall be subsequently tested if required by the Architect, Structural Engineer, or the authority having jurisdiction.
- 3. The aggregates shall be in conformance with ACI 318, as modified by CBC Section 1903A.5.
- 4. Reinforcing Steel is to be tested prior to use for compliance with CBC Section 1910A.2 and ASTM A615 requirements.
 - a. Samples: To be selected by representative of testing laboratory from material at the building site or place of distribution, to consist of two (2) pieces, each 18 inches (18") long of each size, furnished, cut, and prepared for testing by Contractor, marked and delivered by representative of testing laboratory.
 - b. Tests: One (1) tension and one (1) bend test shall be made of each size of reinforcing steel, including wire fabric. One (1) series of tests shall be made for each ten (10) tons, or fraction thereof, of each size of reinforcing steel if the bundles, as delivered, can be identified as to heat number and the mill analysis accompanies the report. If they cannot be identified as to heat number, then one (1) series of tests shall be made for each two and one-half (2-1/2) tons or fraction thereof.
- 5. Cylinder Tests shall comply with CBC Section 1905A.1.16.
 - a. Three (3) cylinders of concrete shall be made for each fifty (50) cubic yards of each grade of concrete, or fraction thereof, being placed each day. Each cylinder shall be dated, given a number, the point in the structure from which the sample was taken noted thereon, and the slump noted thereon.
 - b. Test cylinders shall be made at the job and stored in the testing laboratory in accordance with ASTM C31. At the end of twenty-four (24) hours after making, the cylinders shall be stored under moist curing conditions at approximately 70 degrees F. and maintained therein until tested. The cylinders shall be tested in accordance with ASTM C39. The cylinders shall develop the following minimum ultimate compressive strengths:
 - 1) Design Strength: 3000 psi
 - a) 7 Day Test: 1800 psi
 - b) 28 Day Test: 3000 psi
 - 2) Design Strength: 3500 psi
 - a) 7 Day Test: 2100 psi
 - b) 28 Day Test: 3500 psi
 - c. If the strengths of the first two-cylinder tests are satisfactory, the third cylinder shall not be tested, but destroyed. A third cylinder shall be tested if the strengths of the first two cylinders are not satisfactory.

- d. If the strength of the cylinders does not meet the minimum as mentioned above, core tests of the hardened concrete shall be made as per CBC Section ACI 318, Section 5.5.5.2 and ASTM C42. If the core tests show the concrete strength to be deficient, the concrete shall be deemed defective and removed. The Contractor shall pay all costs of these core tests.
- C. Laboratory Designed Mixes: See Proportioning of Concrete Mixes, Section 03 31 00 "Structural Concrete Work".

1.05 STRUCTURAL STEEL (Refer to Section 05 12 00 "Structural Steel Framing")

- A. Inspections: All structural welding, both shop and field welding, shall be done under the supervision of a qualified welding inspector, qualified in accordance with CBC Section 1705A.2.1, the American Welding Society, CWI, or CAWI, approved by the Architect, Structural Engineer, and the authority having jurisdiction.
- B. The inspector shall furnish the Architect, Structural Engineer, and the authority having jurisdiction with a report on forms supplied that the welding which is required to be inspected is proper and has been done in conformity with the plans and specifications.
- C. He shall check the material, equipment, and procedure, as well as the welds, and the ability of the welding.
- D. The welding inspector shall be employed by the testing laboratory. Inspection of welding shall be according to 2022 California Building Code, Section 1704A.2.1.
- E. Inspection of shop fabrication shall be according to CBC Section 1705A.2.5, AWS D1.1, D1.8 and the approved drawings.
- F. Tests:
 - 1. All structural steel that is to be tested shall be identified per CBC Section 2203A.1 on the "Order for Tests and Inspections" sheet, which is issued at the start of the job. It shall be tested and approved by the testing laboratory prior to fabrication or delivery.
 - If the steel can be identified in accordance with ASTM A6 and is accompanied by mill analysis and test reports for each heat, it may be used without testing. Identification of the steel at the fabricator's plant shall be made by a representative of the testing laboratory.
 - 3. Unidentified structural steel shall be tested to determine conformity to the applicable ASTM standard. It shall be tested and approved by the testing laboratory prior to fabrication or delivery. If the steel can be identified in accordance with ASTM A6 and is accompanied by mill analysis and test reports for each heat, it may be used without testing. Identification of the steel at the fabricator's plant shall be made by a representative of the testing laboratory.
 - 4. When the steel cannot be identified or its source is questionable, it shall be tested to confirm that it meets minimum chemical and mechanical

requirements. One set of tension and bend tests shall be made for each 5 tons, or fractional part thereof, for each size to be used.

5. Automatic End Welded Studs: In accordance with CBC Section 2213A.2.

1.06 WOOD (Refer to Section 06 10 00 "Rough Carpentry")

- A. Lumber and Plywood (Refer to Section 06 10 00 "Rough Carpentry"):
 - 1. Installation of Timber Connectors shall be continuously inspected per 2022 California Building Code, Section 1705A.5.6.
- B. Manufactured Wood Chord Joists (Refer to Section 06 17 00 "Engineered Wood Products"):
 - 1. Continuous inspection during fabrication shall be provided per 2022 California Building Code, Section 1705A.5.5.

QUICK REFERENCE GUIDE FOR TESTS AND INSPECTIONS (AS APPLICABLE)

TITLE 24, PART 2 (2022 CBC) - VOLUME 2 **TESTS AND INSPECTIONS REQUIREMENTS**

A. SOILS AND FOUNDATIONS (CHAPTER 18A):

1. I	nspection:		
á	a. Piles		1810A.3.1.4
2. (Quality:		
á I	a. Compaction Control Testi o. Soils	ng of Earth Fill	3301.1, 1704A.7, 1803A 1705A.6
B. CO	NCRETE (CHAPTER 19A):		
1. 1	Vaterials:		
é	a. Portland Cement		1705A.3.2, 1903A.1
ł	o. Concrete Aggregates		1903A.5
(c. Shotcrete Aggregates		1908A.2
(d. Reinforcing Bars		1705A.3.2, 1910A.2
e	e. Pre-stressing Steel and A	nchorage	1705A.3.4, 1910A.3
2. (Quality:		
é	a. Proportions of Concrete		ACI 318, 1905A
ł	 Strength Tests of Concret 	te	1913A.4
(Splitting Tensile Tests 		
(d. Shotcrete Proportions		1908A.2
6	e. Shotcrete Cores		1908A.10
f	 Composite Construction (Cores	1910A.4
3. I	nspection:		
á	a. Jobsite		1705A.3, Table 1705A.3
ł	o. Batch Plant		1705A.3.3
(c. Waiver of Batch Plant		1705A.3.3.1
(d. Pre-stressed Concrete		1704A.3.4
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		 e. Reinforcing Bar Welding f. Reinforcing Bar Placement g. Post-Install Anchors in Concrete h. Shotcrete i. Concrete Preplacement 	1705A.3.1, AWS D1.4 1705A.3.5 1910A.5 1908A.2 1705A.3.5
C.	ST	EEL (CHAPTER 22A)	
	1.	Materials:	
		a. Structural Steel	2205A.1
		b. Cold Formed Steel	2210A.1
	2	C. Identification	2203A. I
	۷.	a. Tests of Structural and Cold Formed Steel	1705A.2.1, Table 1705A.2.1
		b. Tests of High Strength Bolts, Nuts, Washers	2213A.1, Table 1705A.2.1
		c. Tests of End Welded Studs	2213A.2
		d. Steel Joists	2207A.1, Table 1705A.2.3
	S	e. Non-Destructive Weld Tests	1704A.2
	5.	a Shop Fabrication	1704A 2 5
		b. Welding	1704A.2.5
		c. High Strength Bolt Installation	Table 1705.A.2.1
П	w		
υ.	1.	Materials:	
		a. Lumber and Plywood	2303.1.1
		b. Glued Laminated Members	2303.1.3
	2.	Inspection:	
		a. Wood Structural Elements and Assemblies	1705A.5.4 1705A.5.4 2202.1.2
		D. Giueu Laminaleu Fabrication	1705Α.3.4, 2303.1.3 1705Δ 5 7
		d. Manufactured Open Web Trusses	1705A.6. 2303.4

E. SAFEGUARDS DURING CONSTRUCTION (CHAPTER 33)

END OF SECTION 01 45 23

TEMPORARY FACILITIES AND CONTROLS SECTION 01 50 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Temporary sanitary facilities.
 - 2. Security requirements.
 - 3. Waste removal facilities and services.
 - 4. Project identification sign.

1.02 REFERENCE STANDARDS

- A. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.
- B. ASTM E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

1.03 TEMPORARY UTILITIES

- A. Owner will provide the following:
 - 1. Electrical power and metering, consisting of connection to existing facilities.
 - 2. Water supply, consisting of connection to existing facilities.

1.04 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Use of existing facilities is not permitted.
- C. Maintain daily in clean and sanitary condition.
- D. Use of existing facilities is not permitted.

1.05 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Provide protection for plants designated to remain. Replace damaged plants.
- D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.06 FENCING

A. Provide 6-foot-high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.07 SECURITY

A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.08 VEHICULAR ACCESS AND PARKING

- A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
- B. Coordinate access and haul routes with governing authorities and Owner.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering streets.
- E. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.09 WASTE REMOVAL

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site periodically.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.10 PROJECT IDENTIFICATION

- A. Provide project identification sign of design and construction indicated on Drawings.
- B. Erect on site at location established by Architect.
- C. No other signs are allowed without Owner permission except those required by law.

1.11 FIELD OFFICES

- A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.
- B. Provide space for Project meetings, with table and chairs to accommodate six (6) persons.
- C. Provide separate private office similarly equipped and furnished, for use by Owner Project Inspector.
- D. Locate offices a minimum distance of 30 feet from existing and new structures.

1.12 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities and materials prior to Final Application for Payment inspection.
- B. Remove underground installations to a minimum depth of 2 feet. Contractor shall grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing facilities used during construction to original condition.
- E. Restore new permanent facilities used during construction to a specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 50 00

PRODUCT REQUIREMENTS SECTION 01 60 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1;
 - 2. General product requirements.
 - 3. Transportation, handling, storage and protection.
 - 4. Product option requirements.
 - 5. Substitution limitations.
 - 6. Maintenance materials, including extra materials, spare parts, tools, and software.
- B. Related Sections:
 - 1. Section 01 40 00: Quality Requirements
 - a. Product quality monitoring.

1.02 REFERENCE STANDARDS

A. 16 CFR 260.13 - Guides for the Use of Environmental Marketing Claims; Federal Trade Commission; Recycled Content; Current Edition.

1.03 SUBMITTALS

- A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. Submit within 35 days after date of Notice of Contract Award.
- C. For products specified only by reference standards, list applicable reference standards.
- D. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- E. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

- F. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

1.04 QUALITY ASSURANCE

- A. Manufacturer's Inventory of Product Content: Publicly available inventory of all ingredients identified by name and Chemical Abstract Service Registration Number (CAS RN).
- B. For ingredients considered a trade secret or intellectual property, the name and CAS RN may be omitted, provided the ingredient's role, amount, and GreenScreen Benchmark are given.
- C. Recycled Content: Determine percentage of post-consumer and pre-consumer (post-industrial) content separately, using the guidelines contained in 16 CFR 260.13.
- D. Previously used, reused, refurbished, and salvaged products are not considered recycled.
- E. Wood fabricated from timber abandoned in transit to original mill is considered reused, not recycled.
- F. Determine percentage of recycled content of any item by dividing the weight of recycled content in the item by the total weight of all material in the item.
- G. Determine value of recycled content of each item separately, by multiplying the content percentage by the value of the item.
- H. Acceptable Evidence:
 - 1. For percentage of recycled content, information from manufacturer.
 - 2. For cost, Contractor's cost data.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by the Contract Documents.
- B. DO NOT USE products having any of the following characteristics:
 - 1. Made using or containing CFC's or HCFC's.
 - 2. Containing lead, cadmium, asbestos.

2.02 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.03 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 TRANSPORTATION AND HANDLING

- A. Package products for shipment in a manner to prevent damage; for equipment, packaging to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on the outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.02 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- G. Comply with manufacturer's warranty conditions, if any.
- H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- I. Prevent contact with material that may cause corrosion, discoloration, or staining.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION 01 60 00

EXECUTION AND CLOSEOUT REQUIREMENTS SECTION 01 70 00

PART1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Examination, preparation, and general installation procedures.
 - 2. Surveying for laying out the work.
 - 3. Pre-installation meetings.
 - 4. Cutting and patching.
 - 5. Cleaning and protection.
 - 6. Demonstration and instruction of Owner personnel.
 - 7. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
 - 8. General requirements for maintenance service.
- B. Related Requirements
 - 1. Section 01 11 00: Summary of Work:
 - a. Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
 - Section 01 30 00: Administrative Requirements

 Submittals procedures, electronic document submittal service.
 - 3. Section 01 40 00: Quality Requirements
 - 4. Section 01 45 23: Tests and Inspections
 - a. Testing and inspection procedures.
 - 5. Section 01 50 00: Temporary Facilities and Controls
 - a. Temporary exterior enclosures and interior partitions.
 - 6. Section 01 79 00: Demonstration and Training
 - a. Demonstration of products and systems to be commissioned and where indicated in specific specification sections
 - 7. Individual Product Specification Sections:
 - a. Advance notification to other sections of openings required in work of those sections.
 - b. Limitations on cutting structural members.

1.02 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.03 SUBMITTALS

A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.

- B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
 - 1. On request, submit documentation verifying accuracy of survey work.
 - 2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in conformance with Contract Documents.
 - 3. Submit surveys and survey logs for the project record.
- C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 - a. Structural integrity of any element of Project.
 - b. Integrity of weather exposed or moisture resistant element.
 - c. Efficiency, maintenance, or safety of any operational element.
 - d. Visual qualities of sight exposed elements.
 - e. Work of Owner or separate Contractor.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.04 QUALIFICATIONS

- A. For survey work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.
- B. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in the State in which the Project is located.

1.05 PROJECT CONDITIONS

- A. Use of explosives is not permitted.
- B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- D. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- E. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
 - 1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
 - 2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.

- F. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
 - 1. Minimize amount of bare soil exposed at one time.
 - 2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
 - 3. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- G. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
- H. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
- I. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
- J. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.06 COORDINATION

- A. See Section 01 11 00 "Summary of Work" for occupancy-related requirements.
- B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- C. Notify affected utility companies and comply with their requirements.
- D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

- G. Coordinate completion and clean-up of work of separate sections.
- H. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00 "Product Requirements".

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect four (4) days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation, and installation procedures.
 - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Owner will locate and protect survey control and reference points.
- D. Control datum for survey is that indicated on drawings.
- E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- F. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- H. Utilize recognized engineering survey practices.
- I. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes and invert elevations.
 - 2. Grid or axis for structures.
 - 3. Building foundation, column locations and ground floor elevations.

- J. Periodically verify layouts by same means.
- K. Maintain a complete and accurate log of control and survey work as it progresses.
- L. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

3.05 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. Perform whatever cutting and patching is necessary to:
 - 1. Complete the work.
 - 2. Fit products together to integrate with other work.
 - 3. Provide openings for penetration of mechanical, electrical, and other services.
 - 4. Match work that has been cut to adjacent work.
 - 5. Repair areas adjacent to cuts to required condition.
 - 6. Repair new work damaged by subsequent work.
 - 7. Remove samples of installed work for testing when requested.
 - 8. Remove and replace defective and non-conforming work.
- C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- D. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

- E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- F. Restore work with new products in accordance with requirements of Contract Documents.
- G. Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, "Firestopping" to full thickness of the penetrated element.
- I. Patching:
 - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 - 2. Match color, texture, and appearance.
 - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.07 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition <u>throughout the project</u>.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site <u>periodically</u> and dispose off-site; do not burn or bury.

3.08 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
 - B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.09 DEMONSTRATION AND INSTRUCTION

A. See Section 01 79 00 "Demonstration and Training".

3.10 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.11 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
 - 1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.
- B. Use cleaning materials that are nonhazardous.
- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- F. Clean filters of operating equipment.
- G. Clean debris from roofs, gutters, downspouts, and drainage systems.
- H. Clean site: sweep paved areas, rake clean landscaped surfaces.
- I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.12 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
 - 1. Provide copies to Architect and Owner.
- B. Make submittals (samples at the end of the Section) for close-out as follows:
 - 1. Record drawings and specifications.
 - 2. Operation and Maintenance (O&M) manuals.
 - 3. Disabled Veterans Business Enterprises Certification
 - 4. Consent of Surety
 - 5. Bacteriological Test Report Certification
 - 6. Air Balance Report
 - 7. Extra Materials Stock
- C. Accompany Architect and Project Inspector on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's comprehensive list of items to be completed or corrected.
- D. Notify Architect when work is considered ready for Architect's Final Construction Compliance Inspection.
- E. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Notice of Completion inspection.
- F. Owner will occupy portions of the building as specified in Section 01 11 00 "Summary of Work".
- G. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.
- H. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- I. Notify Architect when work is considered finally complete and ready for Architect's Construction Compliance final inspection.

3.13 MAINTENANCE

- A. Provide service and maintenance of components indicated in specification sections.
- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Notice of Completion or the length of the specified warranty, whichever is longer.

- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION 01 70 00

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL SECTION 01 74 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Waste Management Requirements:
 - a. California Green Building Standards Code 2022 (Title 24, Part 11), Section 5.408.1 requires this project recycle and/or salvage for reuse a minimum of 65% of the non-hazardous construction and demolition waste and demolition waste.
 - b. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
 - c. Required Recycling, Salvage and Reuse: The following <u>may not be</u> <u>disposed</u> of in landfills or by incineration:
 - 1) Aluminum and plastic beverage containers.
 - 2) Corrugated cardboard.
 - 3) Wood pallets.
 - 4) Clean dimensional wood: May be used as blocking or furring.
 - 5) Land clearing debris, including brush, branches, logs, and stumps.
 - 6) Concrete: May be crushed and used as riprap, aggregate, sub-base material or fill if acceptable to the Soils Engineer.
 - 7) Bricks: May be used on project if whole, or crushed and used as landscape cover, sub-base material, or fill.
 - 8) Concrete masonry units: May be used for erosion control or landscape features.
 - 9) Precast concrete panels: May be used for erosion control or landscape features.
 - 10)Asphalt paving: May be recycled into paving for project.
 - 11)Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
 - 12)Glass.
 - 13)Gypsum drywall and plaster.
 - 14)Plastic buckets.
 - 15)Carpet, carpet cushion, carpet tile, and carpet remnants, both new and removed: DuPont (http://flooring.dupont.com) and Interface (www.interfaceinc.com) conduct reclamation programs.
 - 16)Asphalt roofing shingles.
 - 17)Paint.
 - 18)Plastic sheeting.

19)Rigid foam insulation.

20) Windows, doors, and door hardware.

21)Plumbing fixtures.

22) Mechanical and electrical equipment.

23)Fluorescent lamps (light bulbs).

24) Acoustical ceiling tile and panels.

- d. Certification for this project is dependent on diversion of <u>65 %</u>, by weight, of potential landfill trash/waste by recycling and/or salvage.
- e. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.
- f. Methods of trash/waste disposal that **are not acceptable** are:
 - 1) Burning on the project site.
 - 2) Burying on the project site.
 - 3) Dumping or burying on other property, public or private.
 - 4) Other illegal dumping or burying.
 - 5) Incineration, either on- or off-site.
- g. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state, and local requirements, pertaining to legal disposal of all construction and demolition waste materials.
- B. Related Sections:
 - 1. Section 01 11 00 Summary of Work
 - a. List of items to be salvaged from the existing building for relocation in project or for Owner.
 - 2. Section 01 30 00 Administrative Requirements
 - a. Additional requirements for project meetings, reports, submittal procedures, and project documentation.
 - 3. Section 01 50 00 Temporary Facilities and Controls
 - a. Additional requirements related to trash/waste collection and removal facilities and services.
 - 4. Section 01 60 00 Product Requirements
 - a. Waste prevention requirements related to delivery, storage, and handling.
 - 5. Section 01 70 00 Execution and Closeout Requirements
 - a. Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.
 - 6. Section 31 10 00 Site Clearing
 - a. Handling and disposal of land clearing debris.

1.02 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically include building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair, and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove any waste material from the project site to another site or remanufacture it into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating, and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.
- J. Reuse: To reuse construction waste material in some manner on the project site.
- K. Salvage: To remove waste material from the project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements", for submittal procedures.
- B. Waste Management Plan: Include the following information:
 - 1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
 - 2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of the applicable landfill tipping fee(s).
 - 3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
 - 4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
 - 5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
 - 6. Transportation: Identify the destination and means of transportation of materials to be recycled, i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.
 - 7. Recycling Incentives: Describe procedures required to obtain credits, rebates, or similar incentives.
 - 8. Recycling Incentive Programs:
 - a. Where revenue accrues to Contractor, submit copies of documentation required to qualify for incentive.
 - b. Where revenue accrues to Owner, submit any additional documentation required by Owner in addition to information provided in periodic Waste Disposal Report.

END OF SECTION 01 74 00

DEMONSTRATION AND TRAINING SECTION 01 79 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Demonstration of products and systems to be commissioned and where indicated in specific specification sections.
 - 2. Training of Owner personnel in operation and maintenance is required for:
 - a. All software-operated systems.
 - b. HVAC systems and equipment.
 - c. Plumbing equipment.
 - d. Electrical systems and equipment.
 - e. Items specified in individual product Sections.
 - 3. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
 - a. Roofing and other weather-exposed or moisture protection products.
 - b. Finishes, including flooring, wall finishes, ceiling finishes.
 - c. Fixtures and fittings.
 - d. Items specified in individual product Sections.
- B. Related Sections:
 - 1. Section 01 70 00 Execution and Closeout Requirements
 - 2. Other Specification Sections: Additional requirements for demonstration and training.

1.02 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements", for submittal procedures; except:
 - 1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority.
 - 2. Submit one copy to the Commissioning Authority, not to be returned.
 - 3. Make commissioning submittals on time schedule specified by Commissioning Authority.
 - 4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of overall Training Plan; submit in editable electronic format, Microsoft Word 2010 preferred.
- B. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
 - 1. Submit to Architect for transmittal to Owner.
 - 2. Submit to Commissioning Authority for review and inclusion in overall training plan.
- 3. Submit not less than four weeks prior to start of training.
- 4. Revise and resubmit until acceptable.
- 5. Provide an overall schedule showing all training sessions.
- 6. Include at least the following for each training session:
 - a. Identification, date, time, and duration.
 - b. Description of products and/or systems to be covered.
 - c. Name of firm and person conducting training; include qualifications.
 - d. Intended audience, such as job description.
 - e. Objectives of training and suggested methods of ensuring adequate training.
 - f. Methods to be used, such as classroom lecture, live demonstrations, handson, etc.
 - g. Media to be used, such a slides, hand-outs, etc.
 - h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.
- C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
 - 1. Include applicable portion of O&M manuals.
 - 2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
 - 3. Provide one extra copy of each training manual to be included with operation and maintenance data.
- D. Training Reports:
 - 1. Identification of each training session, date, time, and duration.
 - 2. Sign-in sheet showing names and job titles of attendees.
 - 3. List of attendee questions and written answers given, including copies of and references to supporting documentation required for clarification; include answers to questions that could not be answered in original training session.
 - 4. Include Commissioning Authority's formal acceptance of training session.

1.03 QUALITY ASSURANCE

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
 - 1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
 - 2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION – GENERAL

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
- B. Demonstrations conducted during Functional Testing need not be repeated unless an Owner personnel training is specified.
- C. Demonstration may be combined with Owner personnel training if applicable.
- D. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
 - 1. Perform demonstrations not less than two weeks prior to Notice of Completion.
 - 2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
 - 1. Perform demonstrations not less than two weeks prior to Notice of Completion.

3.02 TRAINING – GENERAL

- A. Commissioning Authority will prepare the Training Plan based on draft plans submitted.
- B. Conduct training on-site unless otherwise indicated.
- C. Owner will provide classroom and seating at no cost to Contractor.
- D. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Commissioning Authority.
- E. Provide training in minimum two-hour segments.
- F. The Commissioning Authority is responsible for determining that the training was satisfactorily completed and will provide approval forms.
- G. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
 - 1. The location of the O&M manuals and procedures for use and preservation; backup copies.

- 2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
- 3. Typical uses of the O&M manuals.
- H. Product- and System-Specific Training:
 - 1. Review the applicable O&M manuals.
 - 2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
 - 3. Review instructions for proper operation in all modes, including start-up, shutdown, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
 - 4. Provide hands-on training on all operational modes possible and preventive maintenance.
 - 5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
 - 6. Discuss common troubleshooting problems and solutions.
 - 7. Discuss any peculiarities of equipment installation or operation.
 - 8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
 - 9. Review recommended tools and spare parts inventory suggestions of manufacturers.
 - 10. Review spare parts and tools required to be furnished by Contractor.
 - 11. Review spare parts suppliers and sources and procurement procedures.
- I. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION 01 79 00

SELECTIVE SITE DEMOLITION SECTION 02 41 13

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1
 - 2. Site Demolition
 - a. Removal of all trees, buildings, and structures to clear site.
 - 3. Back filling and site restoration.
 - 4. Protection of trees and other landscape material not slated for removal.
 - 5. Disposal of rubbish and debris offsite.
 - 6. Asbestos abatement.
 - 7. Coordination of salvage material with Owner.
 - 8. Reuse and recycling.
 - 9. Barricades, signs, protective structures, and devices.
 - 10. Clean-up
- B. Related Sections:
 - 1. Section 01 74 00 Construction Waste Management and Disposal
 - 2. Section 31 10 00 Site Clearing
 - 3. Section 31 22 00 Earthwork
- C. Work by Owner:
 - 1. Items noted "NIC" (Not in Contract) including, but not limited to, asbestos and contaminated soil abatement, will be provided by separate Contractor.
 - a. Asbestos Abatement:
 - 1) All asbestos abatement will be performed prior to the start of demolition of this Section.
 - a) Asbestos abatement will be performed by separate Contractor and will be performed as indicated.
 - b. Contaminated Soil Abatement:
 - 1) Contaminated soil abatement will be performed by a separate Contractor. Coordinate demolition work with contaminated Soil Abatement Contractor.

1.02 SUBMITTALS

- A. Record Drawings:
 - 1. Keep a record of the location and size of all capped pipes and/or conduit.
 - 2. Submit record drawings per General Conditions.

1.03 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Work shall comply with applicable provisions of local and State safety and health ordinances.
 - a. Prior to the start of any demolition, the County of Kern Environmental Health Services Department and Basic Compliance Engineering shall be given 48-hour notice by the Contractor.
 - 2. Take out and maintain required permits, approvals, and licenses necessary to legally complete this work.
 - 3. Ensure that subcontractors are properly licensed and have the required permits to perform their work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine the demolition site to determine the extent of the work included in this Contract.
- B. Accept the premises in the condition as found on the first day of work under this Contract.

3.02 PREPARATION

- A. Notify utility companies concerning cut-off or restoration of service, or of relocation or modification of any such service that the work of this contract may require.
- B. Protect and maintain in operation utility or sewer line that is required to remain operative during the period of this contract.

3.03 INSTALLATION OR APPLICATION

- A. Furnish and maintain temporary construction, scaffolding, ladders, runways, hoists, etc.
- B. Maintain a clean and safe work area, and all other affected premises.
- C. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning handling and protection against exposure or environmental pollution.
 - 1. Notify Architect immediately upon encountering hazardous materials.

3.04 PROTECTION OR ADJUSTMENTS

- A. Enclose area of work with fence barricades.
- B. The work area shall be kept securely locked at all times work is in progress.
- C. Post signs and warning devices are necessary to exclude all persons, except those directly connected with the work from work areas.
- D. Protect adjacent buildings, shrubs, trees, and lawns from damage.
- E. Do not interfere with use of adjacent buildings or safe ingress or egress.
- F. Use of explosives will not be permitted.

3.05 CLEANING OR REPAIR

- A. Debris resulting from the work of this Section shall be removed and hauled away from the site.
 - 1. Debris and rubbish shall not be allowed to accumulate on the site.
- B. All material generated by this work shall be disposed of properly outside the project limits, in accordance with all applicable regulations, laws and ordinances.
 1. Sprinkle loose material while being stored, handled, or loaded.
- C. Do not burn rubbish at the site.

3.06 CONDITION OF FINISHED WORK

- A. Trees and shrubs, where indicated, shall be removed along with their roots, stumps, etc.
- B. Protections, tools, materials, plant apparatus, and rubbish or debris shall be removed.
- C. Existing areas to remain, public or private property, that may have been damaged, made dirty, or otherwise disorderly as a result of his work shall be restored to good order.

3.07 SALVAGE

- A. The Owner reserves the right to retain ownership of any equipment or fixtures removed from the property.
 - 1. Removed equipment and fixtures shall be stored neatly in an area designated by the Owner for a period of 48 hours.
 - a. Place in neat piles or stacks.
 - 2. Items that are not claimed by the Owner within the 48-hour time period shall be removed from the site and properly disposed of.
 - 3. Improvements or materials removed from the building shall not be transferred by sale, gift, or in any manner whatsoever to the public.
 - a. Sale or disposal to duly licensed contractors or materialmen is permitted.
 - b. Contractor shall assume all responsibilities arising out of such operation.
- B. Items indicated to be removed, but of salvageable value to the Contractor, may be removed from structure as work progresses.
 - 1. Transport salvaged items from site as they are removed. Storage of removed items onsite will not be permitted.
 - 2. Items or materials removed from the building shall not be transferred by sale, gift, or in any manner whatsoever to the public.
 - a. Sale or disposal to duly licensed contractors or materialmen is permitted.
 - b. Contractor shall assume all responsibilities arising out of such operation.

3.08 RECYCLING AND REUSE

- A. Construction Waste Management Plan (Refer to Section 01 74 00 "Construction Waste Management and Disposal"):
 - 1. Where the local jurisdiction does not have a construction and demolition waste management ordinance that is more stringent, submit a construction waste management plan that:
 - a. Identifies the construction waste materials to be diverted from disposal by efficient usage, recycling, reuse on the project or salvage for future use or sale.
 - b. Determines if construction waste materials will be sorted on-site (source separate) or bulk mixed (single stream).
 - c. Determines if construction waste materials will be sorted on-site (source separate) or bulk mixed (single stream).
 - d. Determines if construction waste materials will be sorted on-site (source separate) or bulk mixed (single stream).
 - e. Construction Waste Management Plan:

- B. Where the local jurisdiction does have a construction and demolition waste management ordinance that is more stringent, submit a construction waste management plan that:
 - 1. Utilize a Waste Management Company that can provide verifiable documentation that the percentage of construction waste material diverted from the landfill complies with this section.
 - a. 65% of construction waste shall be recycled or salvaged and diverted from the landfills per 2022 California Green Building Code, Title 24, Part 11, Section 5.408.

END OF SECTION 02 41 13

CONCRETE FORMING SECTION 03 11 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1
 - 2. Formwork for cast-in place concrete, including shoring, bracing and anchorage.
 - 3. Openings for other work
 - 4. Form accessories.
 - 5. Form stripping.
 - 6. Clean up.

B. Related Sections:

- 1. Section 03 21 00 Reinforcing Steel
- 2. Section 03 31 00 Structural Concrete Work
- 3. Section 03 35 00 Concrete Sealing, Hardening and Finishes
- 4. Section 03 35 20 Polished Concrete Finishing

1.02 REFERENCES

- A. ACI 301 Specifications for Structural Concrete for Buildings; American Concrete Institute International.
- B. ACI 318 Building Code Requirements for Reinforced Concrete and Commentary; American Concrete Institute International.
- C. ACI 347R Guide to Formwork for Concrete; American Concrete Institute International.
- D. PS 1 Construction and Industrial Plywood; National Institute of Standards and Technology (Department of Commerce).

1.03 DESIGN REQUIREMENTS

- A. The contractor is responsible for the design, engineer and construct formwork, shoring, reshoring, and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line, and dimension. Engineering design work to be completed by a professional engineer licensed in the state in which the project is located.
- B. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete. Design work to be completed by a professional engineer licensed in the state in which the project is located.

1.04 SUBMITTALS

- A. Refer to Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product Data: Provide data on void form materials and installation requirements.
- C. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties. Shop drawings to be reviewed by the professional engineer responsible for the design of the formwork and submitted to the Contractor for record.
- D. Openings and Blockouts: Shop drawings shall indicate the exact size and locations of only the slab edges of all openings, blockouts, sleeves and penetrations in structural elements only for review.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 347R, ACI 301, and ACI 318.
- B. Design formwork under direct supervision of a Professional Engineer experienced in design of concrete formwork and licensed in the state in which the project is located.

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for design, fabrication, erection, and removal of formwork.

1.07 AIR QUALITY REQUIREMENTS

A. Comply with the requirements of Section 01 41 00 "Regulatory Requirements" as they are applicable to the work of this section, and as though they are repeated verbatim herein.

1.08 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver form materials and installation instructions in manufacturer's packaging.
- B. Store forms off ground in ventilated and protected manner to prevent deterioration from moisture or damage.

PART 2 PRODUCTS

2.01 WOOD FORM MATERIALS

A. Form Materials: At the discretion of the Contractor to achieve design requirements and specified finishes.

- B. Softwood Plywood: PS 1, B-B High Density Concrete Form Overlay, Class I.
- C. Plywood: Douglas Fir species; solid one side grade; sound undamaged sheets with clean, true edges.
- D. Lumber: Douglas Fir species; structural grade; with grade stamp clearly visible.

2.02 PREFABRICATED FORMS

- A. Preformed Steel Forms: Minimum 16 gage well matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished surfaces.
- B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished concrete surfaces.
- C. Pan Type: Steel, glass fiber, removable of size and profile required.
- D. Tubular Column Type: Round, spirally wound laminated fiber wood, or glass fiber material, surface treated with release agent, of sizes required.
- E. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set.

2.03 FORMWORK ACCESSORIES

- A. Form Ties: Removable or snap-off type, galvanized metal, fixed or adjustable length, cone type, with waterproofing washer, 1 inch back break dimension, free of defects that could leave holes larger than 1 inch in concrete surface.
- B. Form Release Agent: Colorless material that will not stain concrete, absorb moisture, impair natural bonding of concrete finish coatings, or affect color characteristics of concrete finish coatings.
- C. Corners: Chamfered, wood strip type; maximum possible lengths.
- D. Dovetail Anchor Slot: Galvanized steel, minimum 14 gage thick, foam filled, release tape sealed slots, anchors for securing concrete formwork.
- E. Flashing Reglets: Galvanized steel, 16 gage thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

- G. Waterstops: Polyethylene, minimum 2,000 psi tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, six inch (6") wide, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.
 - 1. Greenstreak PVC Waterstops as manufactured by Sitka Corporation.
- H. Waterstops: Preformed mineral colloid strips, 3/8 inch thick, moisture expanding.

PART 3 EXECUTION

3.01 EXAMINATION

A. Contractor shall verify lines, levels, and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 EARTH FORMS

- A. Earth forms may be permitted only where specifically allowed in the Geotechnical report.
- B. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.
- C. Where earth forms are used, increase the sizes of structural elements shown in the drawings by a minimum of three inches.

3.03 ERECTION – FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.
- D. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping.
- E. Align joints and make watertight. Keep form joints to a minimum.
- F. Obtain approval before framing openings in structural members that are not indicated on drawings.
- G. Provide filler and chamfer strips on external corners of beams, joists, columns, and walls where shown on architectural drawings.

- H. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.
- I. Coordinate this section with other sections of work that require attachment of components to formwork.

3.04 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in or passing through concrete work.
- B. Locate and set in place items that will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.
- D. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Install waterstops in accordance with manufacturer's instructions, so they are continuous without displacing reinforcement. Heat seal joints so they are watertight.
- F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- G. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.06 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
 - 1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
 - 2. During cold weather, remove ice and snow from within forms. Do not use deicing salts. Do not use water to clean out forms unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.07 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301.
- B. Camber slabs and beams in accordance with structural drawings requirements.

3.08 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 45 23 "Tests and Inspections".
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

3.09 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads as determined by the engineer responsible for the formwork design.
- B. Remove formwork and reshore structural members as directed by the engineer responsible for the formwork design to permit successive construction.
- C. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- D. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.
- E. Remove formwork in such a sequence as to achieve similar concrete surface coloration.

END OF SECTION 03 11 00

REINFORCING STEEL SECTION 03 21 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Reinforcing steel for cast-in-place concrete and concrete masonry units.
 - 2. Supports and accessories for steel reinforcement.
- B. Related Sections
 - 1. Section 03 31 00: Structural Concrete Work.

1.02 REFERENCES

- A. ACI 301 Specifications for Structural Concrete for Buildings; American Concrete Institute International.
- B. ACI 318 Building Code Requirements for Reinforced Concrete and Commentary; American Concrete Institute International.
- C. ASTM A 82 Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
- D. ASTM A 184/A 184M Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement.
- E. ASTM A 185 Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
- F. ASTM A 497/A 497M Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
- G. ASTM A 615/A 615M Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- H. ASTM A 704/A 704M Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
- I. ASTM A 706/A 706M Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
- J. ASTM A 996/A 996M Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
- K. AWS D1.4 Structural Welding Code Reinforcing Steel; American Welding Society.

- L. CRSI (DA4) Manual of Standard Practice; Concrete Reinforcing Steel Institute.
- M. CRSI (P1) Placing Reinforcing Bars; Concrete Reinforcing Steel Institute.

1.03 SUBMITTALS

- A. Shop Drawings: <u>Only when deviations are made from the contract documents</u>, submit shop drawings under provision of Section 01 31 00 "Project Management and Coordination" with deviations clearly identified.
 - 1. Indicate sizes, spacings, locations and quantities of reinforcing steel, wire fabric, bending and cutting schedules, splicing, stirrup spacing, supporting and spacing devices.
- B. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.
- C. Reports: Submit certified copies of mill test report of reinforcement materials analysis, indicate physical and chemical analysis.
- D. Welders Certificates: Submit certifications for welders employed on the project, verifying AWS qualifications with the previous 12 months.

1.04 QUALITY ASSURANCE

A. Perform work of this section in accordance with CRSI (DA4), CRSI (P1), ACI 301, and ACI SP-66.

1.05 AIR QUALITY REQUIREMENTS

A. Comply with the requirements of Section 01 41 00 "Regulatory Requirements" as they are applicable to the work of this section, and as though they are repeated verbatim herein.

PART 2 PRODUCTS

2.01 REINFORCEMENT

- A. Reinforcing Steel: ASTM A 615/A 615M Grade 60.
 - 1. Deformed billet-steel bars.
 - 2. Unfinished.
- B. Reinforcing Steel: ASTM A 706/A 706M, deformed low-alloy steel bars.
 - 1. Deformed billet-steel bars.
 - 2. Unfinished.

- C. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gage acceptable patented system.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement, including load bearing pad on bottom to prevent vapor barrier puncture.
 - 3. Provide stainless steel, plastic, or plastic-coated steel components for placement within 1¹/₂" of weathering surfaces.

2.02 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4) Manual of Standard Practice.
- B. Welding of reinforcement is permitted only with the specific approval of Structural Engineer. Perform welding in accordance with AWS D1.4.
- C. Obtain approval from the architect for additional reinforcing splices not indicated on drawings.

PART 3 EXECUTION

3.01 PLACEMENT

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

3.02 FIELD QUALITY CONTROL

A. An independent testing agency, as specified in Section 01 45 23 "Tests and Inspections", will inspect installed reinforcement for conformance to contract documents before concrete placement.

END OF SECTION 03 21 00

STRUCTURAL CONCRETE WORK SECTION 03 31 00

PART 1 GENERAL

1.01 SUMMARY:

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1
 - 2. Structural concrete and slabs for buildings and structures
 - 3. Under slab drainage and gravel beds
 - 4. Under slab perforated vent piping
 - 5. Placing of bolts, anchors, frames, inserts, etc.
 - 6. Protection and patching of concrete
 - 7. Concrete pits and slabs for plumbing, electrical, heating and ventilation inside of buildings or structures.
 - 8. Submittal preparation and concrete mix designs
 - 9. Superplasticizers and admixtures
 - 10. Control and expansion joints
 - 11. Clean-up.
- B. Related Sections:
 - 1. Section 03 11 00: Concrete Forming
 - 2. Section 03 21 00: Steel Reinforcing.
 - 3. Section 03 35 00: Concrete Floor Sealing, and Hardening
 - 4. Section 03 35 20: Polished Concrete Finishing.
 - 5. Section 07 92 00: Joint Sealants.
 - 6. Section 32 13 13: Site Concrete.

1.02 REFERENCES

- A. ACI 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International.
- B. ACI 301 Specifications for Structural Concrete for Buildings; American Concrete Institute International.
- C. ACI 302.1R Guide for Concrete Floor and Slab Construction; American Concrete Institute International.
- D. ACI 304R Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International.
- E. ACI 305R Hot Weather Concreting; American Concrete Institute International.
- F. ACI 306R Cold Weather Concreting; American Concrete Institute International.
- G. ACI 308R Guide to Curing Concrete; American Concrete Institute International.

- H. ACI 318 Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International.
- I. ASTM C 33 Standard Specification for Concrete Aggregates.
- J. ASTM C 39/C 39M Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- K. ASTM C 94/C 94M Standard Specification for Ready-Mixed Concrete.
- L. ASTM C 143/C 143M Standard Test Method for Slump of Hydraulic-Cement Concrete.
- M. ASTM C 150 Standard Specification for Portland Cement.
- N. ASTM C 173/C 173M Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
- O. ASTM C 260 Standard Specification for Air-Entraining Admixtures for Concrete.
- P. ASTM C 309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- Q. ASTM C 494/C 494M Standard Specification for Chemical Admixtures for Concrete.
- R. ASTM C 618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- S. ASTM C 685/C 685M Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.
- T. ASTM C 881/C 881M Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
- U. ASTM C 1059 Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.
- V. ASTM C 1107/C 1107M Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
- W. ASTM E 1155 Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers.
- X. ASTM E 1155M Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers [Metric].

1.03 DEFINITIONS

- A. Severe Exposure: Concrete which is in contact with moisture or deicing salts, such as pavements, sidewalks, parking garage floors, etc.
- B. Moderate Exposure: Concrete which is occasionally exposed to moisture, such as exterior walls, beams, girders, and slabs not in contact with soil, etc.

1.04 SUBMITTALS

- A. Product Data: Submit product data for proprietary products.
- B. Mix Designs:
 - 1. Submit proposed concrete mix designs for each class or use at least 30 days prior to required delivery.
 - 2. Mixes shall be prepared by a professional engineer licensed in the state in which the project is located.
 - 3. Specifically indicate where each class of concrete is to be used.
 - 4. Indicate individual and combined aggregate gradations and aggregate source and characteristics.
- C. Test Reports: Submit aggregate and concrete mix test reports from independent testing laboratory as required by Section 01 45 23 "Tests and Inspections".

1.05 QUALITY ASSURANCE

- A. Certifications:
 - 1. Submit material certification for admixtures and aggregates, certifying their compliance with specifications.
 - 2. Submit certified mill test reports for each lot of cement.
- B. Perform work of this section in accordance with ACI 301 and ACI 318.
- C. Acquire cement from same source and aggregate from same source for entire project.
- D. Follow recommendations of ACI 305R for concreting during hot weather.
- E. Follow recommendations of ACI 306R for concreting during cold weather.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver packaged products to site in manufacturer's sealed and labeled containers; inspect to verify compliance with specified requirements.
- B. Label containers to indicate manufacturer's name, product name, date of manufacture, and instructions for use.

- C. Store liquid materials in tightly covered containers in well-ventilated area at ambient temperatures recommended by manufacturer. Store dry materials on raised platforms and cover to prevent moisture damage. Maintain containers in clean condition, free of foreign materials and residue with labels in legible condition.
- D. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.07 AIR QUALITY REQUIREMENTS

A. Comply with the requirements of Section 01 41 00 "Regulatory Requirements" as they are applicable to the work of this section, and as though they are repeated verbatim therein.

PART 2 PRODUCTS

2.01 REINFORCEMENT

A. Comply with the requirements of Section 03 21 00 "Reinforcing Steel".

2.02 CONCRETE MATERIALS

- A. Portland Cement:
 - 1. ASTM C150, Type as indicated in the structural drawings.
 - 2. Air-entraining portland cement, as defined by ASTM C150, is prohibited.
- B. Aggregate:
 - 1. Coarse Aggregate: ASTM C33 for normal weight aggregate.
 - 2. Fine Aggregate: ASTM C33.
 - 3. Exposed Aggregate: To match Architect's sample.
- C. Water: Clean, fresh and potable.
- D. Admixtures:
 - 1. Calcium chloride, thiocyanates, or admixtures containing more than 0.05 percent chloride ions are not permitted unless approved by Architect.
 - 2. Air Entraining: ASTM C260.
 - 3. Water-reducing: ASTM C494, Type A.
 - 4. High Range Water-reducing (Superplasticizer): ASTM C494, Type F or Type G.
 - 5. Water-reducing, Non-corrosive, Non-chloride Accelerator:
 - a. ASTM C494, Type E.
 - b. Submit long term non-corrosive test data from independent testing laboratory using accelerated test method such as electrical potential measure.
 - 6. Water-reducing, Retarding: ASTM C494, Type D.
 - 7. Chemical Corrosion Inhibitor:
 - a. Calcium nitrite in liquid form.
 - b. Acceptable Product: DCI by Grace Construction Products, Cambridge, MA.

- E. Synthetic Fibers:
 - 1. Monofilament or fibrillated polypropylene fibers.
 - 2. Acceptable Products:
 - a. Fiberstrand, Euclid Chemical Company, Cleveland, OH.
 - b. Fibermesh, Fibermesh, Chattanooga, TN.
 - c. Forta CR, Forta Corporation, Grove City, PA.
- F. Bonding Admixture:
 - 1. Acrylic or styrene butadiene, non-remulsifiable.
 - 2. Acceptable Products:
 - a. Flex-Con or SBR Latex, Euclid Chemical Company, Cleveland, OH.
 - b. Everbond, L&M Construction Chemicals, Inc., Omaha, NE.
 - c. Acryl Set, Master Builders, Cleveland, OH.
 - d. Intralok, W. R. Meadows, Inc., Elgin IL.
- G. Bonding Grout:
 - 1. Mix consisting of portland cement, part fine sand passing No. 30 mesh sieve, bonding admixture, and water in proportions as recommended by bonding admixture manufacturer.
 - 2. Minimum 1:1 cement to sand ratio.
 - 3. Mix to achieve consistency of thick cream.
- H. Membrane Vapor Barrier:
 - 1. Comply with the requirements of the construction drawings for slab vapor barrier.
- I. Sheet Curing Materials: ASTM C171; white opaque polyethylene film, white polyethylene coated burlap sheeting, or regular waterproof paper.
- J. Dissipating Resin Curing Compounds:
 - 1. ASTM C309, Type 1 [1-D] clear or translucent [with fugitive dye] [Type 2 white pigmented at exterior locations], Class B, free of natural or petroleum waxes. Class A not acceptable.
 - 2. Liquid, membrane forming, 100 percent resin based allowing maximum moisture loss in 72 hours of 0.11 lb/sq. ft.
 - 3. Compatible with subsequent coatings and toppings.
 - 4. Acceptable Products:
 - a. Kurex, Chem-Masters Corporation, Madison, OH.
 - b. Kurez DR, Euclid Chemical Company, Cleveland, OH.
 - c. L&M Cure DR, L&M Construction Chemicals, Inc., Omaha, NE.
 - d. 3100 Clear, W. R. Meadows, Inc., Elgin, IL.
 - e. ABCO 1309 Resin Cure, Nox-Crete Chemicals, Omaha, NE.
 - f. Kurez VOX, Euclid Chemical Co., Cleveland, OH.
 - g. L&M Cure R, L&M Construction Chemicals, Inc,. Omaha, NE
 - h. 1100 Clear, W.R. Meadows, Elgin, IL.

- K. Acrylic Curing/Sealing Compounds:
 - 1. ASTM C1315, Type I [I-D] clear or translucent [with fugitive dye] [Type II white pigmented at exterior locations], Class A [B] [C], free of natural or petroleum waxes.
 - 2. Liquid, membrane forming, minimum 30 percent [12 percent] [22 percent] acrylic resin solids, allowing maximum moisture loss in 72 hours of 0.08 lb/sq. ft.
 - 3. Compatible with subsequent coatings and toppings.
 - 4. Acceptable Products:
 - a. Super Rez-Seal (31 percent) [Rez-Seal (14 percent)] [Eucocure (18 percent)], Euclid Chemical Company, Cleveland, OH.
 - b. Dress & Seal 30 [18] [Dress & Seal], L&M Construction Chemicals, Inc., Omaha, NE.
 - c. Tiah (30 percent) [CS-309 (12 percent)], W. R. Meadows, Inc., Elgin, IL.
 - d. ABCO Cure & Seal 830 (30 percent) [309 (12 percent)] [800 (22 percent)], Nox-Crete Chemicals, Omaha, NE.
 - e. Cure & Seal 31 percent [14 percent] [18 percent], Symons Corporation, Des Plaines, IL.
- L. Water Based Acrylic Curing/Sealing Compounds:
 - 1. ASTM C1315, Type I, Class A [B] [C], VOC compliant, free of natural or petroleum waxes. Dries clear with high [medium] gloss sheen.
 - 2. Liquid, membrane forming, minimum 30 percent [20 percent] acrylic resin solids, allowing maximum moisture loss in 72 hours of 0.08 lb/sq. ft.
 - 3. Acceptable Products:
 - a. Super Diamond Clear VOX, Euclid Chemical Company, Cleveland, OH.
 - b. Dress & Seal WB 30, L&M Construction Chemicals, Inc., Omaha, NE.
 - c. VOCOMP 30, W. R. Meadows, Inc., Elgin, IL.
- M. Chemical Curing Compounds:
 - 1. Penetrating liquid, non-film forming, solution of sodium, potassium and meta silicate compounds.
 - 2. Compatible with subsequent coatings and toppings.
 - 3. Acceptable Products:
 - a. L&M Cure, L&M Construction Chemicals, Inc., Omaha, NE.
 - b. Eucosil, Euclid Chemical Company, Cleveland, OH.
 - c. Sonosil, Sonneborn Building Products, Shakopee, MN.
 - d. Dust-Gard, W. R. Meadows, Inc., Elgin, IL.

2.02 ACCESSORIES

- A. Crusher Run Fines fill under slabs shall conform to ASTM C33 for fine aggregate #10.
- B. Crushed Rock fill under slabs shall be 3/4" x #4 coarse aggregates.

- C. Construction joint waterstops shall be a 75% sodium bentonite and 25% butyl composite.
 - 1. Volclay #RX-102, 3/4" x 3/8" or equal. Use Volclay Setseal adhesive. All penetrations and slab to footing joints shall receive waterstop treatment.

2.03 CONCRETE MIXES

- A. Mix Design:
 - 1. Contractor employed testing agency shall not be same firm as Owner employed testing agency.
 - 2. Use concrete of approved mix designs only.
 - 3. The proportioning of ingredients shall provide a concrete readily worked into forms and around reinforcement under conditions of placement to be employed, without segregation or excessive bleeding.
 - 4. Do not place concrete until design mix for that class and type of concrete is reviewed by Architect.
 - 5. Indicate locations in structure where each mix design is to be used.
 - 6. Identify each mix design with code number which will be used on batch tickets.
- B. Design Compressive Strengths: As indicated on Structural Drawings.
 - 1. Normal Weight Concrete:
 - a. Compressive strength, when tested in accordance with ASTM C 39/C 39M, strength at 7 days shall be at least 60% of the minimum required 28-day strength unless noted otherwise on drawings.
 - b. Maximum slump 4 inches +/- 1".
- C. Maximum Size of Coarse Aggregate:
 - 1. 1/5 narrowest dimension between form sides.
 - 2. 1/3 depth of slabs.
 - 3. 3/4 of minimum clear distance between reinforcing bars, wires, or bundles of bars.
 - 4. 1 inch maximum for normal weight concrete or 3/4 inch maximum for light weight concrete.
- D. Concrete Slump at Point of Discharge:
 - 1. Ramps and Sloping Surfaces: Not more than 3 inches.
 - 2. Reinforced Foundations: Not less than 1 inch and not more than 4 inches.
 - 3. Concrete Containing Superplasticizer: Not more than 9 inches after addition of superplasticizer. Slump before addition of superplasticizer: 2 to 3 inches.
 - 4. Other Concrete: Not less than 1 inch and not more than 4 inches.
 - 5. Allowable tolerances of up to 1 inch above maximum indicated provided average of 10 most recent batches tested is less than maximum.
- E. Minimum Cement Content: Not less than 470 pounds of total cementitious material per cubic yard of concrete. Not more than 25% flyash or pozzolan cement substitute and not less than 385 pounds of cement per cubic yard of concrete.
- F. Water-Cement Ratios for Concrete (by weight):
 - 1. Maximum permissible water cement ratio: 0.50 unless noted otherwise on drawings.

- G. Admixtures:
 - 1. Only use admixtures which have been tested and approved in mix designs.
 - 2. Air entraining Admixture:
 - a. Use in concrete exposed to freezing and thawing at any time during construction or in completed structure.
 - b. Use in concrete placed at ambient temperatures below 40 degrees F.
 - c. Tolerance on air content as delivered: Plus or minus 1-1/2 percent.
 - 3. Conform to air content requirements indicated on Drawings.
- H. Maximum water-soluble chloride ion concentrations in hardened concrete at ages from 28 to 42 days contributed from all ingredients, expressed as percent by weight of cement as follows:
 - 1. Concrete over galvanized deck: 0.06 percent.
 - 2. Concrete exposed to chloride in service: 0.15 percent.
 - 3. Other concrete: 1.00 percent.
- I. Shrinkage Tests:
 - 1. Prior to placing any concrete for walls or horizontal surfaces, a trial batch of each mix design of structural concrete shall be prepared using the aggregates, cement and admixture (if any) proposed for the project. From each trial batch at least 3 specimens for determining drying shrinkage shall be prepared. The drying shrinkage specimens shall be a 4" x 4" x 11" prisms fabricated, cured, dried, and measured in accordance with the requirements of Tentative Method of Test for Length Change of Cement Mortar and Concrete, ASTM C157. The measurements shall be made and reported separately for 7 and 28 days of drying after 7 days of moist curing. The effective gage length of the specimens shall be 10", and except for the foundation concrete, the average drying shrinkage at 35 days shall not exceed .054%.
 - 2. Previous Test: Ready-mixed concrete manufacturer may furnish certified test reports from approved Testing Laboratory as proof of meeting shrinkage requirements, provided aggregate used and concrete covered by such test report conform to mix design approved for use on this project. Method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs.
- J. Use accelerating admixtures in cold weather only when approved by Architect/Structural Engineer. Use of admixtures will not relax cold weather placement requirements.

2.04 MIXING

- A. Ready-Mix Concrete:
 - 1. Comply with ASTM C 94/C 94M.
 - 2. Before using trucks for batching, mixing, and transporting concrete, thoroughly clean trucks and equipment of materials capable of contaminating concrete.
 - 3. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 is required.

- 4. When the air temperature is between 85 degrees F and 90 degrees F, reduce mixing and delivery time from 90 minutes to 75 minutes, and when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.
- 5. Do not add water to ready-mix concrete at Project site except when slump is below specified limits and total water does not exceed the design water-cement ratio; inject added water into mixer and mix thoroughly before discharging.
- B. Provide certificate signed by authorized official of supplier with each load of concrete stating following:
 - 1. Time truck left plant.
 - 2. Mix of concrete, identify with code number of mix design.
 - 3. Amount of water and cement in mix.
 - 4. Amount and type of admixtures.
 - 5. Amount of water added at project site.
 - 6. Time truck is unloaded at project site.
- C. Truck mixers without batch tickets will be rejected.
- D. Retain certificates at Project site. Submit to Architect for review upon request.

2.05 PRODUCTION

- A. Ready Mixed Concrete
 - 1. Except as otherwise provided in these specifications, ready mixed concrete shall be batched, mixed, and transported in accordance with ASTM C94 "Specification for Ready Mixed Concrete."
- B. Mixing Water Control
 - 1. Concrete which arrives at the jobsite with slump below that specified for placement may be adjusted by the addition of water to increase slump, provided the maximum slump is not exceeded and the maximum water content of the design mix is not exceeded. Following any such water addition, the concrete shall be mixed at mixing speed for at least 30 revolutions of the drum.
 - 2. After adjustment is made to the proper slump, the concrete shall be discharged as long as it retains its placeability without the further addition of water.
 - 3. Concrete shall be placed within one and one half hours after mixer is charged in average conditions. Time shall be reduced to one hour during hot weather concreting.

2.06 SOURCE QUALITY CONTROL

- A. Concrete materials and operations shall be tested and inspected for compliance with the specifications and requirements.
- B. Independent Testing Laboratory, approved by Architect and employed by Contractor, is responsible for:
 - 1. Testing aggregate as follows at start of work and whenever change in aggregate source occurs:
 - a. Gradation and fineness modulus: ASTM C136.

- b. Specific gravity: ASTM C127 for coarse aggregate, ASTM C128 for fine aggregate.
- c. Organic impurities: ASTM C40.
- d. Effect of organic impurities on strength: ASTM C87 for effect of organic impurities on strength.
- e. Potential reactivity of aggregate: ASTM C295, petrographic examination.
- f. Soundness: ASTM C88.
- g. Reports of tests conducted on aggregates from the same source within the past 12 months will be acceptable.
- 2. Testing concrete mixes as follows at start of work and whenever change in materials source occurs:
 - a. Prepare mix designs, test concrete strength, and report results if trial batch method is used to establish design mix proportions. Mix design shall be reviewed, approved, sealed and stamped by a Licensed Professional Engineer in the state where the project is located.
- C. Independent Testing Laboratory, employed by Owner, is responsible for observing and evaluating the following at batch plant at start of Work and at other times as requested by the Architect:
 - 1. Condition of batching equipment.
 - 2. Conformance with design mix proportions.
 - 3. Storage of materials.
 - 4. Mixing equipment.
 - 5. Mixing and transporting equipment.
 - 6. Other testing to verify compliance if requested by Architect.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify forms, reinforcement, anchors, plates, joint materials, vapor retarder and other items to be cast into concrete are accurately placed and held securely.
- B. Verify forms are free of debris and water.
- C. Verify excavations are free of loose material and water.

3.02 TESTING

A. Concrete materials and operations shall be tested and inspected for compliance with the specifications and requirements.

3.03 TESTING AGENCY

- A. The testing agency shall be designated by the owner. Ample time shall be allowed for preliminary tests as required prior to concreting operations.
- B. All testing agency personnel shall meet the requirements of ASTM E329, "Recommended Practice of Inspecting and Testing Agencies for Concrete and Steel in Construction."

C. All testing agency personnel shall have the knowledge and ability to perform the necessary tests equivalent to the minimum guideline for Certification of Concrete Field Testing Technicians, Grade 1 in accordance with ACI CP-2.

3.04 DUTIES AND SERVICES

A. The duties and responsibilities of the testing agency and the contractor and services to be performed by each are as designated in ACI 301, Chapter 16, "Specifications for Structural Concrete for Buildings."

3.05 EVALUATION AND ACCEPTANCE

- A. Test results of standard cylinders, molded, cured, and tested according to ASTM C31 and C39 should be evaluated separately for each concrete mix according to ACI 214, "Recommended Practice for Evaluation of Concrete Compression Test Results of Field Concrete."
- B. The criteria for acceptance of concrete shall be as detailed in ACI 318, Chapter 5, Section 5.6, "Evaluation and Acceptance of Concrete" or as per ASTM C94, Section 17 "Strength" and Section 18 "Failure to Meet Strength Requirements."
- C. As referenced in ASTM C94 Section 4.4, "When the strength of concrete is used as a basis for acceptance, the manufacturer shall be entitled to copies of all test reports."

3.06 PREPARATION

- A. Construction Joints:
 - 1. Clean previously placed concrete of laitance.
 - 2. Clean reinforcement and accessories of mortar from previous concrete placement operations.
 - 3. Apply bonding agent in accordance with manufacturer's recommendations.
 - 4. Moisten surface of previously placed concrete.

3.07 PLACEMENT

- A. Place concrete according to ACI 301 and 304R, except as modified and supplemented on Drawings or in this Section.
- B. Notify Architect and Owner's testing laboratory minimum of 48 hours prior to commencement of placing operations.
- C. Cold Weather Concreting:
 - 1. Comply with requirements of ACI 306.1.
 - Do not place concrete when ambient air temperature is expected to fall below 40 degrees F within 24 hours, except with prior written approval of Architect.
 - 3. Remove frost, ice, and snow from formwork, reinforcing, and accessories prior to placing concrete.
 - 4. Do not place concrete foundations, footings or slabs on frozen ground.

- 5. Limit concrete temperature at time of discharge to 55 degrees F for sections less than 12 inches in any dimension and to 50 degrees F for other sections.
- D. Hot Weather Concreting:
 - 1. Comply with requirements of ACI 305R when ambient air temperature exceeds 75 degrees F.
 - 2. Use water-reducing, retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions to extend setting time to limits specified as approved by Architect.
 - Cool aggregates, cool mixing water, substitute ice for part of mixing water, or take other measures to limit concrete temperature at time of discharge to 90 degrees F.
 - 4. Cover reinforcing steel and steel forms with water soaked burlap or use fog spray to limit temperature of steel to 120 degrees F immediately prior to concrete placement.
 - 5. Use evaporation retardant between finishing passes.
- E. At time of placement, provide concrete temperature between 50 degrees F and 90 degrees F.
- F. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- G. Repair underslab vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inches and seal watertight.
- H. Separate slabs on grade from vertical surfaces with joint filler.
- I. Place joint filler in floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- J. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface.
- K. Install joint devices in accordance with manufacturer's instructions.
- L. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- M. Install joint device anchors for expansion joint assemblies specified in Section 05 81 0. Maintain correct position to allow joint cover to be flush with floor and wall finish.
- N. Apply sealants in joint devices in accordance with Section 07900.
- O. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

- P. Place concrete continuously between predetermined expansion, control, and construction joints.
- Q. Do not interrupt successive placement; do not permit cold joints to occur.
- R. Place floor slabs in pattern indicated.
- S. Saw cut joints within 12 hours after placing.
- T. Screed floors level, maintaining surface flatness of maximum 1/4 inch in 10 ft.
- U. Screed floors level, maintaining the minimum F(F) Floor Flatness and F(L) Floor Levelness values specified when measured in accordance with ASTM E 1155/ASTM E 1155M.
- V. Maintain surfaces receiving concrete at approximately same temperature as concrete being placed.
- W. Maintain surface of hardened concrete below 100 degrees F.
- X. Convey concrete from mixer to place of deposit by method that will prevent segregation or loss of material, and that will not require addition of water to produce desired slump at point of placement. Do not use supported reinforcing as runway base for concrete conveying equipment.
- Y. Depositing:
 - 1. Deposit concrete as nearly as practicable to its final location.
 - 2. Place concrete continuously between construction joints.
 - 3. Deposit concrete in layers not exceeding 24 inches in depth.
 - 4. Avoid inclined layers.
 - 5. Place each layer while preceding layer is still plastic.
 - 6. Do not allow free fall of concrete to exceed 4 feet. Do not allow free fall of concrete containing high-range water reducing admixture to exceed 10 feet.
 - 7. Drop concrete in vertical direction, not at incline.
 - 8. Place beams, girders, haunches, brackets, column capitals, and drop panels monolithic with slab system unless otherwise indicated.
 - 9. Do not cast beams, girders, and slabs supported on columns and walls until concrete in supporting element is no longer plastic, minimum of 2 hours.
 - 10. If forms and reinforcing above level of concrete already in place become coated with accumulations of hardened or partially hardened concrete, remove accumulations before proceeding.
 - 11. Place concrete without displacing reinforcing and accessories.
- Z. Consolidation:
 - 1. Vibrate concrete to eliminate formation of surface air voids, honeycombs and sand streaks.
 - 2. Use mechanical, internal vibrators with proper frequency, rpm, and spud size. Select spud for size and spacing of reinforcement and clearance to formwork. Supplement vibration by hand-spading, rodding, or tamping.

- 3. Insert and withdraw vibrator vertically at spacing not to exceed 1-1/2 times radius of action of vibrator, maximum of 24 inch centers.
- 4. Insert vibrators into placed layer and at least 6 inches into preceding layer.
- 5. Do not allow vibrator to touch form face or embedded items.
- 6. Do not use mechanical vibration for slabs less than 4 inches thick. Use hand spading and tamping in these locations.
- AA. Placing Concrete Slabs:
 - 1. Deposit and consolidate concrete slabs in continuous operation, in single layer, within limits of construction joints, until placing of panel or section is completed.
 - 2. Bring slab surfaces to correct level with straightedge and strike-off.
 - 3. Use bull floats, highway straight edges, or darbies to produce smooth surface, free of humps or hollows before bleed water appears on surface.
 - 4. Do not disturb slab surfaces prior to beginning finishing operations.
 - a. Scrub bonding grout into base slab surface or apply bonding agent in accordance with manufacturer's recommendations].
 - b. Rewettable bonding agent may be used only in areas not subject to wet conditions.
 - c. Place topping slab before grout has set or dried, compact, float and finish.
- BB. Curbs and Equipment Pads:
 - 1. Form curbs and equipment pads in areas indicated.
 - 2. Placement on same day:
 - a. Place and consolidate base slab.
 - b. Screed to elevation to allow for curb/pad thickness.
 - c. After bleed water has disappeared and surface will support worker's weight without indentation, place curb/pad concrete mixture, compact, and float.
 - 3. Placement after one day:
 - a. Place and consolidate base slab.
 - b. Brush partially set surface with wire broom to remove laitance and scratch surface.
 - c. Wet cure base slab at least three days.
 - d. Immediately, prior to placing curb/pad concrete, clean base slab and dampen surface.
 - e. Scrub bonding grout into base slab surface, or apply bonding agent in accordance with manufacturer's recommendations.
 - f. Place curb/pad concrete before grout has set or dried, compact and float.
 - 4. Finish interior curbs and pads by stripping forms while concrete is still green and steel trowel surfaces to hard, dense finish with corners, intersections and terminations slightly rounded.

3.08 DEPOSITING

A. Concrete shall be continuously deposited. When continuous placement is not possible, construction joints shall be located as approved by the Architect. Concrete shall be deposited as close to its final point of placement as possible.

- B. Concrete shall be consolidated by vibration, spading, rodding or forking. Work concrete around reinforcements, embedded items and into corners. Eliminate all air or rock pockets and other causes of honeycombing, pitting or planes of weakness.
- C. Internal vibration shall have a minimum frequency with amplitude to consolidate the concrete effectively. See ACI 309, "Recommended Practice for Consolidation of Concrete."
 - 1. Vibrators shall be operated by experienced and competent workmen.
 - 2. Use of vibrators to transport concrete shall not be allowed.
 - 3. Vibrators shall be vertically inserted every 18 inches for 5 to 15 seconds and then withdrawn.

FINISHING

- A. General: Provide finishes at specified locations, unless indicated otherwise.
- B. Finishing Formed Surfaces:
 - 1. Rough Form Finish:
 - a. Leave surfaces with texture imparted by forms, except patch tie holes and defects.
 - b. Remove fins and other projections exceeding 1/4 inch in height.
 - c. Locations: Concrete surfaces not exposed to view.
 - 2. Smooth Form Finish:
 - a. Provide smooth, hard, uniform surface with minimum number of seams.
 - b. Repair and patch defective areas, fill tie holes, remove fins and other projections completely. Leave tie holes unfilled where indicated on Drawings.
 - c. Locations: Exposed concrete surfaces or concrete surfaces designated to receive coatings applied directly to concrete, such as waterproofing, dampproofing, plaster, painting, and other similar applied finishes.
 - 3. Smooth Rubbed Finish:
 - a. Provide smooth rubbed finish to newly hardened concrete, which has already received smooth form finish, not later than one day after form removal.
 - b. Moisten concrete surfaces and rub with carborundum brick or other abrasive device until uniform color and texture is produced.
 - c. Do not use cement grout other than cement paste drawn from concrete by rubbing process.
 - d. Locations: Where scheduled or indicated on Drawings [_____].
 - 4. Grout Cleaned Finish:
 - a. Provide grout cleaned finish to smooth form finished concrete which are complete and accessible.
 - b. Blend one part portland cement with 1-1/2 parts fine sand and mix with 1:1 ratio of bonding admixture and water to achieve consistency of thick paint. Match color of surrounding concrete.
 - c. Wet surface of concrete sufficiently to prevent absorption of water from grout and apply grout uniformly with brushes or spray.

- d. Immediately after applying grout, scrub surface vigorously with cork float or stone to coat surface and fill air bubbles and holes.
- e. While grout is still plastic, remove excess grout by working surface with rubber float, sack or other means.
- f. After surface becomes white from drying, rub vigorously with clean burlap.
- g. Keep surface damp for minimum 36 hours after final rubbing.
- h. Locations: Where scheduled or indicated on Drawings [_____].
- 5. Cork Float Finish:
 - a. Remove forms at early stage, not later than 3 days after placement of concrete [;ream control joints as indicated on Drawings].
 - b. Provide cork float finish to concrete which has already received smooth form finish.
 - 1. Mix one part portland cement and one part fine sand with sufficient water to produce stiff mortar.
 - 2. Dampen wall surface.
 - 3. Apply mortar with firm rubber float or trowel, filling voids.
 - 4. Compress mortar into voids using slow-speed grinder or stone.
 - 5. If mortar surface dries too rapidly to permit proper compacting and finishing, apply small amount of water with fog sprayer.
 - 6. Produce final texture with cork float using swirling motion.
 - 7. Locations: Where [scheduled] indicated on Drawings.]
- C. Finishes for Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces, strike-off smooth and finish with texture matching adjacent formed surfaces.
- D. Slab Finishes:
 - 1. Floor flatness/levelness tolerances:
 - a. F_F defines maximum floor curvature allowed over 24 inches. Computed on basis of successive 12 inch elevation differentials, F_F is commonly referred to as "flatness F-Number."

 $F_{F} = 4.57$

Maximum difference in elevation, in inches, between successive 12-inch elevation differences.

b. F_L defines relative conformity of floor surface to horizontal plane as measured over 10 feet distance. F_L is commonly referred to as "levelness F-Number."

F_L = <u>12.5</u>

Maximum difference in elevation, in inches, between two points separated by 120 inches.

- c. Measure floors in accordance with ASTM E1155.
- d. Ensure slabs achieve specified overall tolerances. Minimum local tolerance (1/2 bay or as designated by Architect) is 2/3 of specified tolerance unless noted otherwise.
- 2. Scratch Finish:
 - a. Level to F_F15/F_L13 tolerance with minimum local tolerance of F_F13/F_L10 roughen surface with stiff brushes or rakes before final set.

- b. Locations: Slabs to receive thick set mortar beds, concrete floor topping, portland cement terrazzo and other similar bonded cementitious finish flooring materials over 1 inch in thickness.
- 3. Float Finish:
 - a. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating.
 - b. Begin floating when surface water has disappeared and when concrete has stiffened sufficiently to permit operation of power-driven floats.
 - c. Cut down high spots and fill low spots.
 - d. Immediately after leveling, re-float surface to uniform, sandy texture and a $F_F 20/F_L 17$ tolerance.
 - e. Locations: Surfaces requiring trowel finish, broom finish, slab surfaces covered with insulation, slabs scheduled to receive adhered roofing membrane, waterproofing membrane, exposed aggregate finish and sand bed terrazzo.
- 4. Trowel Finish:
 - a. After float finish, follow by power troweling and then hand troweling.
 - b. Begin final troweling when surface produces ringing sound as trowel is moved over surface.
 - c. Finish surface free of trowel marks, uniform in texture and appearance, and to $F_F 25/F_L 20$ elevated slab tolerance.
 - d. Grind surface smooth to remove defects which may telegraph through applied finish.
 - e. Locations: Slabs left exposed to view, slabs covered with resilient flooring, carpet, paint and other similar applied finish.
- 5. Fine Broom Finish:
 - a. After trowel finish, while surface is still plastic, draw soft fiber bristle broom uniformly over surface to create fine-grained but smooth texture to match Architect's sample.
 - b. Locations: Interior slabs covered with thin set tile, stairs, and ramps.
- 6. Heavy Broom Finish:
 - a. After float finish, while surface is still plastic, draw fiber bristle broom uniformly over surface to provide texture perpendicular to main traffic or at right angles to floor slope to match Architect's sample.
 - b. Locations: Garage floors, sidewalks, ramps, exterior steps, landings, and platforms.
- E. Construction and Control Joints in Slab-on-grade:
 - 1. Construction joints to coincide with planned control joint pattern.
 - 2. Provide joints in at column lines and as indicated on Drawings.
 - 3. Tooling Control Joints and Construction Joints:
 - a. Slabs Exposed to View: Tool joints after finishing slab.
 - b. Concealed Slabs:
 - 1) Provide joints immediately after final finishing.
 - 2) Use dry-cut sawing system (Soft-Cut) to depth of 1 inch unless noted otherwise; without dislodging aggregates by sawing. Complete sawing no later than two hours after finishing at each control joint location.

3.09 CURIING

- A. General:
 - 1. Comply with ACI-308, except as modified or supplemented.
 - 2. Start immediately after placing and finishing concrete.
 - 3. Protect from premature drying, temperature extremes, temperature variations, rain, flowing water, and mechanical injury.
 - 4. Cure continuously, without allowing to dry, for minimum period required for hydration of cement and hardening of concrete.
 - 5. Maintain temperature of concrete above 50 degrees F for curing period.
 - 6. Minimum Length of Curing Period:
 - a. High Early Strength Concrete: 3 days.
 - b. Other Concrete: 7 days.
- B. Acceptable Curing Methods:
 - 1. Concrete to receive Waterproofing, Dampproofing, or Membrane Roofing: Moist curing, moisture-retaining sheet covering, or chemical curing compounds.
 - 2. Concrete to receive Hardeners or Sealers: Moist curing, moisture-retaining sheet covering, dissipating resin compounds, or chemical curing compounds; acceptable to manufacturer of hardener or sealer.
 - 3. Concrete to receive Cement Setting Beds, Bonded Toppings: Moist curing, moisture-retaining sheet covering, or chemical curing compounds.
 - 4. Concrete to receive Adhered Finishes: Moist curing, moisture-retaining sheet covering, acrylic curing/sealing compounds, dissipating resin compounds, or chemical curing compounds; acceptable to manufacturer of applied finish.
 - 5. Cast-in-place Parking Structure Slabs: Moist curing, or dissipating resin compounds.
 - 6. Concrete exposed to Direct Sun when Ambient Temperature Exceeds 75 degrees F: Where permitted, use white pigmented liquid compounds.
 - 7. Other Concrete: Moist curing, moisture-retaining sheet covering, liquid membrane-forming compounds, or chemical curing compounds.
- C. Acceptable Curing Procedures:
 - 1. Moist Curing Unformed Surfaces:
 - a. Ponding: Maintain 100 percent coverage of water continuously.
 - b. Fog Spraying or Sprinkling: Maintain continuously moist with nozzles or sprayers.
 - c. Fabric Mats: Cover surfaces with wet burlap or other absorptive material which will not discolor concrete; keep continuously wet.
 - d. Sand: Minimum 2 inch thick layer, kept continuously saturated with water, free from deleterious materials which would stain concrete.
 - 2. Sheet Curing Unformed Surfaces:
 - a. Wet surface of concrete with fine spray of water prior to applying sheet.
 - b. Immediately cover surface with polyethylene sheeting, waterproof paper, or burlap-polyethylene sheet.
 - c. Lap edges of sheeting minimum of 12 inches.
 - d. Repair damaged sheet.
 - e. Ballast sheet to prevent movement and blow-off.
 - 3. Liquid Membrane-forming Compound Curing of Unformed Surfaces:
 - a. Apply in accordance with manufacturer's recommendations.

- b. Protect surfaces from foot and vehicular traffic.
- c. Curing compounds used must be compatible with adhesives used in setting carpet, resilient tile or sheeting flooring, and other similar finishes.
- 4. Curing Formed Surfaces:
 - a. Keep forms continuously moist.
 - b. Loosen forms for vertical surfaces to allow curing water to run between concrete and forms.
 - c. If forms are removed prior to end of curing period, continue curing with any of methods described for unformed surfaces.
- 5. Curing surfaces which are moist cured for first 24 hours may be cured by other acceptable methods for remaining curing period provided they are not allowed to become dry.

3.10 FIELD QUALITY CONTROL

- A. Field testing will be performed under the provisions of Section 01 45 23 "Tests and Inspections".
- B. Independent testing laboratory, employed by Owner, is responsible for:
 - 1. Sampling Fresh Concrete: ASTM C172, sample at point of discharge from mixer and additionally at point of discharge from end of pipe for concrete conveyed by pumping methods; if water is added at Project site, obtain another sample for testing.
 - 2. Concrete Temperature: Test each time slump and air content are tested and each time set of compressive strength test specimens is made.
 - 3. Slump: ASTM C143; one test from first truck at point of discharge each day, one test each time set of compressive strength test specimens is made, and when change in consistency occurs.
 - 4. Air Content of Plastic Mix:
 - a. For Normal Weight, Air Entrained Concrete: ASTM C231, pressure method or ASTM C173, volumetric method.
 - b. For Lightweight, Air Entrained Concrete: ASTM C173, volumetric method.
 - c. Make one test each time a set of compressive strength test specimens is made.
 - 5. Compressive Strength Tests:
 - a. Make and cure test specimens in accordance with ASTM C31, from concrete sampled at point of discharge from mixer and additionally at point of discharge from end of pipe for concrete conveyed by pumping methods.
 - b. Make one set of 4 test cylinder specimens for every 100 cubic yards, or for every 5000 square feet of slabs and walls, or fraction thereof, of each class of concrete, with at least one set for each class each day.
 - c. Test cylinders in accordance with ASTM C39, 2 at 7 days for information, and 2 at 28 days for acceptance.
 - d. When frequency of testing will provide less than five strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches, or from each batch if fewer than 5 are used.
- 6. Environmental Conditions:
 - a. When ambient air temperature falls below 40 degrees F, record maximum and minimum air temperature in each 24 hour period; record air temperature inside protective enclosure; record minimum temperature of surface of hardened concrete.
 - b. When ambient air temperature rises above 85 degrees F, record maximum and minimum air temperature in each 24 hour period; record minimum relative humidity; record maximum wind velocity, and record maximum temperature of surface of hardened concrete.
- 7. Observe conveying, placement and consolidation of concrete for conformance to Specifications.
- 8. Observe condition of formed surfaces upon removal of formwork prior to repair of surface defects and observe repair of surface defects.
- 9. Observe curing procedures for conformance with Specifications, record dates of concrete placement, start of preliminary curing, start of final curing, end of curing period.
- 10. Observe Preparations for Placement of Concrete:
 - a. Inspect handling, conveying, and placing equipment, inspect vibrating and compacting equipment.
 - b. Inspect preparation of construction, expansion, and isolation joints.
- 11. Observe preparations for protection from hot weather, cold weather, sun, and rain and preparations for curing.
- 12. Observations of Concrete Mixing:
 - a. Monitor and record amount of water added at Project site.
 - b. Observe minimum and maximum mixing times.
- 13. Other Inspections:
 - a. Grouting under base plates.
 - b. Grouting anchor bolts and reinforcing steel in hardened concrete.
- 14. Test for Water Soluble Chloride Ion Content in Hardened Concrete:
 - a. Test in accordance with procedure described in FHWA Report No. FHWA RD-77-85.
 - b. Make one test for each set of compressive strength test specimens.
 - c. Test may be waived by Architect upon written request from Contractor after review of concrete design mix has been made.
- 15. Verify slab flatness and levelness within 24 hours of placement for each slab finish at slab-on-grade and framed slabs in accordance with ASTM E1155. Perform minimum of 2 tests for each slab and finish; one at initial pour and second randomly chosen by testing laboratory.
- C. Evaluation and Acceptance of Concrete:
 - 1. Strength Test: Defined as average strength of two 28 day cylinder tests from each set of cylinders.
 - 2. Acceptance Criteria Based on Strength Tests: Strength level of individual class of concrete is considered satisfactory if both:
 - a. Average of three consecutive strength test results equal or exceed required design compressive strength, and

- b. No individual strength test result falls below required design compressive strength by more than 500 psi.
- 3. Acceptance Criteria Based on Field Tests:
 - a. Core Tests: Where strength tests indicate concrete of deficient strength, obtain and test cores in accordance with ASTM C42, ACI 318 and ACI-301, at locations directed by Architect.
 - b. Strength level of concrete in area represented by core test is considered adequate if complies with the requirements of ACI 318.
 - c. Fill core holes with low slump concrete or patching mortar used to repair surface defects.
- 4. Revise concrete mix proportions, curing procedures and protection as necessary to provide concrete conforming to Specifications.
- D. Acceptance of Structure:
 - 1. Acceptance of structure for dimensional tolerances, appearance, and strength will be based on ACI-301, Chapter 18.
 - 2. Remove and replace concrete which does not meet acceptance criteria.

3.11 PATCHING AND REPAIRING DEFECTIVE CONCRETE

- A. General:
 - 1. Rewettable bonding agent may be used only in areas not subject to wet conditions.
 - 2. Patching compound may only be used for concrete not exposed to view.
- B. Repairing Formed Surfaces:
 - 1. Surface Defects Requiring Repair:
 - a. Color and texture irregularities.
 - b. Honeycomb, air bubbles, rock pockets, and spalls.
 - c. Fins, burrs and other surface projections.
 - d. Cracks.
 - e. Stains and other discolorations that cannot be removed by cleaning.
 - 2. Patch defective areas and tie holes immediately after removal of forms.
 - 3. Cut out honeycomb, rock pockets, and voids over 1/4 inch down to solid concrete but not less than 1 inch depth.
 - 4. Make edges of cuts perpendicular to concrete surface.
 - 5. Clean and dampen area including 6 inches of surrounding surface with water.
 - 6. Apply bonding grout by brushing into surface, after surface water has evaporated.
 - 7. Place patching mortar or patching compound before grout has set or dried.
 - 8. Compact patching material in place and strike off slightly higher than surrounding surface.
 - 9. Finish after minimum of one hour to match surrounding surface.
 - 10. Flush out form tie holes, fill with patching mortar, patching compound, or precast cement cone plugs secured in place with bonding compound.
 - 11. Cure repair areas by same methods as surrounding concrete or keep continuously damp for 7 days.

- C. Repairing Unformed Surfaces:
 - 1. Surface Defects Requiring Repair:
 - a. Fine crazing cracks.
 - b. Cracks larger than 0.012 inch wide or cracks which penetrate to reinforcing.
 - c. Cracks penetrating completely through non-reinforced sections.
 - d. Spalling, popouts, honeycomb, and rock pockets.
 - e. High and low areas in slabs.
 - 2. Correct high areas in hardened concrete by grinding after concrete has cured at least 14 days.
 - 3. Correct high and low areas during, or immediately after, completion of initial floating operations by cutting high areas and by placing fresh concrete in low areas.
 - 4. Repair defective areas, except isolated random cracks and single holes not exceeding 1 inch diameter, by cutting out and replacing with patching mortar or patching compound.
 - a. Remove defective areas to sound concrete with clean, square cuts.
 - b. Dampen concrete surfaces in contact with patching material and apply bonding grout by brushing into surface, after surface water has disappeared.
 - c. Place patching mortar or patching compound before grout has set or dried.
 - d. Compact and finish to blend with adjacent finished concrete.
 - e. Cure in same manner as adjacent concrete.
 - 5. Repair isolated random cracks and single holes not over 1 inch diameter with patching mortar.
 - a. Groove top of cracks and cut out holes to sound concrete and clean area.
 - b. Dampen cleaned surfaces and apply bonding grout by brushing into surface, after surface water has disappeared.
 - c. Place patching material before bonding grout is set or dry.
 - d. Compact in place and finish to match adjacent concrete.
 - e. Keep patched area continuously moist for not less than 72 hours.
- D. Structural Repairs: Contractor shall propose materials, methods, and procedures to the Architect for review and approval prior to proceeding with structural repairs.

3.12 PROTECTION

- A. Protect finished work in accordance with Section 01 70 00 "Execution and Closeout Requirements".
- B. Protect concrete from construction traffic, weather, or mechanical damage for 14 days after placing.
- C. Provide raised runways for traffic areas.
- D. Protect concrete from staining.

END OF SECTION 03 31 00

CONCRETE FLOOR SEALING, AND HARDENING SECTION 03 35 00

PART1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Single application cure-seal-hardener:
 - a. New concrete floors.
 - b. Existing concrete floors.
 - 3. Submittal preparation.
 - 4. Clean-up.

B. Related Sections:

- Section 03 31 00
 Section 03 35 20
 Section 32 13 13 Structural Concrete Work
- Polished Concrete Finishing
- Site Concrete

1.02 SUBMITTALS

- A. Submit under provisions of the Section 01 30 00 "Administrative Requirements".
- B. Material requirements for concrete to which cure-seal-hardener is to be applied, including cement type, water-cement ratio, type of trowel finish, limitations on admixtures, pigments, bonding agents, and bond breakers, etc.
- C. Product Data: Manufacturer's data sheets, including product specifications, test data, preparation instructions and recommendations, storage and handling requirements and recommendations, and installation methods.
- D. Maintenance instructions, including precautions for avoiding staining after application.

1.03 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301, ACI 302 and ACI 303.
- B. Obtain materials from same source throughout.

- C. Installer Qualifications:
 - 1. Applicator experienced with installation of product and certified by manufacturer, or applicator experienced with similar products and providing manufacturer's field technician onsite to advise on application procedures; and providing adequate number of skilled workers trained and familiar with application requirements.
- D. Project Conditions:
 - No satisfactory procedures are available to remove petroleum or rust stains from concrete. Prevention is therefore essential. Take precautions to prevent staining of concrete prior to application of cure-seal-hardener and for minimum of three months after application:
 - a. Prohibit parking of vehicles on concrete slab.
 - b. If vehicles must be temporarily parked on slab, place drop cloths under vehicles during entire time parked.
 - c. If construction equipment must be used for application, diaper all components that might drip oil, hydraulic fluid, or other liquids.
 - d. Prohibit pipe cutting using pipe cutting machinery on concrete slab.
 - e. Prohibit temporary placement and storage of steel members on concrete slab.
 - 2. Do not install products under environmental conditions outside manufacturer's absolute limits.
 - 3. Do not use frozen material; thaw and agitate prior to use.
- E. Warranty:
 - 1. Provide manufacturer's warranty that a structurally sound concrete surface prepared and treated according to the manufacturer's directions will remain permanently dustproof, hardened, and water repellant. If after the specified sealing period the treated surface does not remain dustproof, hardened, and water repellent, provide, at manufacturer's expense, sufficient material to reseal defective areas.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sealer-Hardener:
 - Ashford Formula, by Curecrete, which is located at: 1203 W. Spring Creek PI.; Springville, UT 84663; Toll Free Tel: (800) 998-5664; Tel: (801) 489-5663; Email: request info; Web: <u>www.ashfordformula.com</u>
- B. Request for substitutions will be considered in accordance with the provisions of the Section 01 30 00 "Administrative Requirements".

2.02 MATERIALS

- A. Cure-Seal-Hardener: Ashford Formula; water-based chemically reactive penetrating sealer and hardener, that seals by densifying concrete so that water molecules cannot pass through, but air and water vapor can, while allowing concrete to achieve full compressive strength, minimizing surface crazing, and eliminating dusting.
 - 1. Colorless, transparent, odorless, non-toxic, non-flammable.
 - 2. Containing no solvents or volatile organic compounds.
 - 3. USDA approved for food handling facilities.
 - 4. Allowing traffic on floors within 2 to 3 hours, with chemical process complete within 3 months.
 - 5. No change to surface appearance except a sheen developed due to traffic and cleaning.
- B. Water: Clean, potable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared and are suitable for application of product.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 DELIVERY, STORAGE AND HANDLING

- A. Deliver product in factory numbered and sealed drums, with numbers recorded for Owner's records.
- B. Store products in manufacturer's unopened drums until ready for installation.

3.04 INSTALLATION

- A. General:
 - 1. Install in accordance with manufacturer's instructions.
 - 2. If this is the applicator's first project using this product, provide the manufacturer's technical representative onsite to familiarize installers with proper procedures.
 - 3. Prevent damage to and soiling of adjacent work.
- B. Sealer-Hardener:
 - 1. New Concrete: Apply cure-seal-hardener to new concrete as soon as the concrete is firm enough to walk on after troweling, except on colored concrete, wait minimum of 30 days.
 - a. Spray on at rate of 20 square feet per gallon (4.8 sq m/L).
 - b. Keep surfaces wet with cure-seal-hardener for minimum soak-in period of 30 minutes, without allowing drying out or becoming slippery. In hot weather, slipperiness may appear before the 30 minute time period has elapsed. If that occurs, apply more cure-seal-hardener as required to keep entire surface in a non-slippery state for the first 15 minutes. For the remaining 15 minutes, mist the surface as needed with water to keep the material in a non-slippery state.
 - c. After this period, when treated surface becomes slippery, lightly mist with water until slipperiness disappears.
 - d. Wait for surface to become slippery again and then flush entire surface with water, removing all residue of cure-seal-hardener.
 - e. Squeegee surface completely dry, flushing any remaining slippery areas until no residue remains.
 - f. Wet vacuum or scrubbing machines may be used to remove residue, provided manufacturer's instructions are followed.
 - 2. Existing Concrete: Apply cure-seal-hardener only to clean bare concrete.
 - a. Thoroughly remove previous treatments, laitance, oil, and other contaminants.
 - b. Saturate surface with cure-seal-hardener; respray or broom excess onto dry spots.
 - c. Keep surface wet with cure-seal-hardener for minimum soak-in period of 30 to 40 minutes.
 - d. If, after the 30-minute soak-in period, most of the material has been absorbed, remove all excess material using broom or squeegee, especially from low spots.
 - e. If, after the 30-minute soak-in period, most of the material remains on the surface, wait until it becomes slippery and then flush entire surface with water removing all residue of cure-seal-hardener and squeegee completely dry, flushing any remaining slippery areas until no residue remains.
 - f. If water is not available, remove residue using squeegee.

3.05 PROTECTION

- A. Protect installed floors until chemical reaction process is complete; at least three (3) months.
 - 1. Comply precautions listed under Project Conditions.
 - 2. Clean the floor regularly in accordance with manufacturer's recommendations because water will accelerate the sealing, and scrubbing will impart a shine.
 - 3. Clean up spills immediately and spot-treat stains with good degreaser or oil emulsifier.
- B. Precautions and cleaning are the responsibility of the Contractor performing the Work.

END OF SECTION 03 35 00

POLISHED CONCRETE FINISHING SECTION 03 35 20

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Polished Concrete.
 - 3. Submittal preparation.
 - 4. Clean-up.
- B. Related Sections:
 - 1. Section 03 31 00 Structural Concrete Work.
 - 2. Section 07 92 00 Joint Sealants

1.02 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 302.1R Guide for Concrete Floor and Slab Construction.
 - 2. ACI 117 Specifications for tolerances for Concrete Construction
- B. ASTM International:
 - 1. ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - 2. ASTM C171 Standard Specification for Sheet Materials for Curing Concrete.
 - 3. ASTM C779 Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
 - 4. ASTM E1155 Standard Test Method for determining FF floor flatness and FL Floor Levelness numbers.
- C. National Floor Safety Institute (NFSI):
 - 1. NFSI Test Method 101-A Standard for Evaluating High-Traction Flooring Materials, Coatings, and Finishes.

1.03 QUALITY ASSURANCE

- A. Source Quality Control:
 - 1. Ensure concrete finishing components and materials are from single manufacturer.
- B. Qualifications:
 - 1. Installer Qualifications: Installer experienced in performing work of this Section who has specialized in installation of work similar to that required for this project.
 - 2. Installer/applicator certified by concrete finish equipment and chemical manufacturer and shall provide adequate number of skilled workmen who are thoroughly trained and experienced in the necessary craft.

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- 3. Applicator Qualifications: Applicator capable of providing field service representation during construction and approving application method.
- 4. Provide a letter of certification from both the equipment and chemical manufacturer stating that the installer is a certified applicator and is familiar with proper procedures and installation requirements recommended by the manufacturer.
- C. Regulatory Requirements:
 - 1. NFSI Test Method 101-A Phase Two Level High Traction Material.
- D. Mock-Ups:
 - 1. Mock-Up Size: Concrete subcontractor to provide 100 ft² (9.3 m²) sample panel for polishing at jobsite at location as directed under conditions similar to those which will exist during actual placement. Forms should be clean and free from extraneous substances with a level plywood bottom.
 - 2. Mock-up will be used to judge workmanship, concrete substrate preparation, operation of equipment, material application, color selection, and shine.
 - 3. Allow 48 hours for inspection of mock-up before proceeding with work.
 - 4. When accepted, mock-up will demonstrate minimum standard of quality required for this work. <u>Approved mock-up may not remain as part of finished</u> <u>work.</u> Remove mock-up and dispose of materials when no longer required and when directed.
 - 5. Aggregate selected must be an accepted industry standard local aggregate ensured to accept polish.
 - 6. Include control joints in mock-up. Sawing can begin as soon as the surface is firm enough not to displace any of the aggregate.
- E. Pre-installation Meetings: Conduct a pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Conduct meeting with all trades prior to initial slab pour. Comply with Section 01 30 00 "Administrative Requirements". Review the following:
 - 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. Installation of polished floor finishes.
 - 9. Application of liquid hardener, densifier.
 - 10. Protection of finished surfaces after installation.
 - 11. Placing of material on the concrete surface that may cause staining, etching, or scratching.

1.04 SYSTEM DESCRIPTION

- A. Performance Requirements: Provide polished flooring that has been selected, manufactured, and installed to achieve the following:
 - 1. Abrasion Resistance: ASTM C779, Method A, high resistance, no more than 0.008 inch (0.20 mm) wear in 30 minutes.
 - 2. Reflectivity: Increase of 35% as determined by standard gloss meter.
 - 3. Waterproof Properties: Rilem Test Method 11.4, 70% or greater reduction in absorption.
 - 4. High Traction Rating: NFSI 101-A, non-slip properties.
- B. Design Requirements:
 - 1. Placement Properties:
 - a. Natural concrete slump of 4 inches (114 mm). Admixtures may be used.
 - b. Flatness Requirements:
 - 1) Overall, a minimum of FF= 75. Submit independent flatness finish testing results. Floors not in compliance will be required to be brought into compliance prior to beginning polishing.
 - 2) Floor Levelness FL = 30.
 - 2. Hard-Steel Troweled Concrete: No burn marks. Finish to ACI 302.1R, Class 5 floor. Concrete must be machine-troweled at placement.
 - a. Class 5 floors, mineral aggregate hardener with repeated hard steel trowel finish.
 - b. Do not consolidate concrete with the use of tamping or vibrations.
 - 3. Curing Options:
 - a. Membrane-forming curing compounds (ASTM C309, Type 1, Class B, all resin, dissipating cure).
 - 1) Acrylic curing and sealing compounds not recommended.
 - 2) Burlap curing not recommended.
 - b. Sheet membrane (ASTM C171); polyethylene film not recommended.
 - c. Damp Curing: Minimum of 28 days prior to polishing.

1.05 ACTION SUBMITTALS

- A. General: Submit listed submittals in accordance with Contract Conditions and Section 01 30 00 "Administrative Requirements".
- B. Shop Drawings: Indicate information on shop drawings as follows:
 - 1. Typical layout including dimensions and floor grinding schedule.
 - 2. Plan view of floor and joint pattern layout.
 - 3. Areas to receive polished surface treatment.
 - 4. Hardener, sealer, densifier in notes.
- C. Product Data: Submit product data, including applicator's product data sheet, for specified products.
 - 1. Preparation and concrete grinding procedures.

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- 2. Polished Concrete Surface.
- 3. Local aggregate and hardness factor according to Mohs Scale of Hardness.

1.06 INFORMATION SUBMITTALS

- A. Quality Assurance:
 - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties as cited in 1.03 Performance Requirements.
 - 2. Certificates:
 - a. Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and 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 applicator declaring contractor as an approved installer of polishing system.
 - 3. Applicator's Instructions: Applicator's installation instructions.

1.07 CLOSE-OUT SUBMITTALS

- A. Warranty: Submit warranty documents specified.
 - 1. Operation and Maintenance Data: Submit operation and maintenance data for installed products in accordance with Division 01 Section "Operation and Maintenance Data".

1.08 PROJECT CONDITIONS

A. Installation Location: Comply with applicator's written recommendations.

1.09 WARRANTY

- A. Project Warranty: Refer to Contract Conditions for project warranty provisions.
- B. Applicator's Warranty: Submit, for Owner's acceptance, applicator's standard warranty document executed by authorized company official. The applicator's warranty is in addition to, and does not limit, other rights Owner may have under Contract Documents.
- C. Warranty: Commencing on date of acceptance by Owner.

1.10 MAINTENANCE

A. Comply with applicator's written instructions to maintain installed product.

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PART 2 PRODUCTS

2.01 POLISHED CONCRETE FINISHING PRODUCTS

- A. Applicator:
 - 1. Total Polish Solutions, Inc., 4636 Fennel Rd., Knoxville, TN 37912, Phone: (865) 633-5051.
- B. Proprietary Products/Systems:
 - 1. Hardener, Sealer, Densifier: Proprietary, water-based, odorless liquid, VOC compliant, environmentally safe chemical hardening solution leaving no surface film.
 - a. Acceptable Material: Pentra-Sil 244+.
 - 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. Oil Repellant Sealer: Ready to use, silane, siloxane, and fluoropolymers blended water-based solution sealer, guick-drying, low-odor, oil and water repellent, VOC compliant, and compatible with chemically hardened floors. a. Acceptable Material: Pentra-Guard HP.
 - 4. Cleaning Solution: Proprietary, mild, highly concentrated liquid concrete cleaner and conditioner containing wetting and emulsifying agents; biodegradable, environmentally safe and certified High Traction by National Floor Safety Institute (NFSI).
 - 5. Finish: Standard Medium gloss (MG-2), 800 grit.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Site Verification of Conditions:
 - 1. Verify that concrete substrate conditions, which have been previously installed under other sections or contracts, are acceptable for product installation in accordance with manufacturer's instructions prior to installation of concrete finishing materials.
- B. Verify Concrete Slab Performance Requirements:
 - 1. Verify concrete is cured to 28-day strength.
 - 2. Verify concrete surfaces received a hard steel-trowel finish during replacement.

3.02 DELIVERY, STORAGE AND HANDLING

- A. Ordering:
 - 1. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- B. Delivery:
 - 1. Deliver materials in manufacturer's original packaging with identification labels and seals intact.
- C. Storage and Protection:
 - 1. Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 - 2. Protect Concrete Slab:
 - a. Protect from petroleum stains during construction.
 - b. Diaper hydraulic power equipment.
 - c. Restrict vehicular parking.
 - d. Restrict use of pipe cutting machinery.
 - e. Restrict placement of reinforcing steel on slab.
 - f. Restrict use of acids or acidic detergents on slab.
 - g. Restrict use of red or black chalk, construction paint, any dye, and permanent markers.
 - h. Use of blue chalk with an acrylic clear coat is acceptable.
 - i. Diaper tires where white rubber tires or non-marring materials are not available.
- D. Waste Management and Disposal:
 - 1. Separate waste materials for Reuse and Recycling in accordance with Section 01 74 00 "Construction Waste Management" and Disposal".
 - 2. Remove from site and dispose of packaging materials at appropriate recycling facilities.

3.03 SEQUENCING AND SCHEDULING

A. Sequence with Other Work: Comply with applicator's written recommendations for sequencing construction operations.

3.04 PREPARATION

- A. Ensure surfaces are clean and free of dirt and other foreign matter harmful to performance of concrete finishing materials prior to installation of polish materials.
- B. Examine surface to determine soundness of concrete for polishing.
- C. General Contractor to remove surface contamination.

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3.05 INSTALLATION

- A. 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. Diamond polish concrete floor surfaces with power disc machine having a planetary head as recommended by floor finish applicator. Planetary head Power polishing machine shall be of a size to apply sufficient pressure equal to or greater than the pressure provided with HTC 420 polishing equipment. Sequence with coarse to fine grit.
 - a. Comply with applicator's recommended 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.
 - d. Grind the concrete floor, removing construction debris, floor slab imperfections, and until there is a uniform scratch pattern and desired concrete aggregate exposure is achieved. Vacuum the floor thoroughly using a squeegee vacuum attachment.
 - e. Fill construction joints and cracks with filler products as specified in accordance with manufacturer's instructions colored to match (or contrast) with concrete color as specified by Architect.
 - f. Apply densifying impregnator undiluted at approximately 200 square feet per gallon in accordance with manufacturer's specifications. Two coats of the hardener/densifier shall be supplied. Allow 12 hours for the densifier to fully cure prior to polishing.
 - g. Grind the floor with metal-bonded diamond grits, grinding 90 degrees from each previous grind and removing all the scratches from the previous grit. Vacuum the floor thoroughly after each grind, using a squeegee vacuum attachment.
 - h. Grind the edges with grinding pads, removing all of the scratches from the previous grit. Vacuum the floor thoroughly after each grind, using a squeegee vacuum attachment.
 - i. Polish the floor, to desired sheen level, with phenolic resin-bonded diamond grits, first polishing the edges with pads of the same grit and then the field of the floor, removing all scratches from the previous grit. After each polish, clean the floor thoroughly using clean water and an auto-scrubber or a mop and a wet vacuum.
 - j. Apply stain resist and/or friction stone, buff with white pad, as needed.

3.06 ADJUSTMENTS

- A. Polish to higher gloss those areas not meeting specified gloss levels per mock-up.
- B. Fill joints flush to surface.

3.07 PROTECTION

A. Protect installed products from damage during construction.

3.08 FINAL CLEANING

- A. Mechanically scrub treated floors for seven days with soft to medium pads with approved cleaning solution.
- B. Upon completion, General Contractor must remove surplus and excess materials, rubbish, tools, and equipment.

END OF SECTION 03 35 00

CLAY UNIT MASONRY SECTION 04 21 00

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Clay masonry units and accessories including:
 1. Thin veneer brick.
- B. Flashing.
- C. Weepholes.
- D. Concrete Pier Cap
- E. Mortar.
- F. Water-Resistive Barrier

1.02 RELATED SECTIONS

A. Section 03 31 00 Structural Concrete Work.
B. Section 04 22 00 Reinforced Concrete Unit Masonry.
C. Section 05 50 00 Metal Fabrications.
D. Section 06 10 00 Rough Carpentry.
E. Section 07 62 00 Sheet Metal Flashing and Trim.
F. Section 09 28 13 Cementitious Backing Board

1.03 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM A36 Standard Specification for Carbon Structural Steel.
 - 2. ASTM A82 Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - 3. ASTM A153 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 4. ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - 5. ASTM A775 Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
 - 6. ASTM A996 Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.

- 7. ASTM B370 Standard Specification for Copper Sheet and Strip for Building Construction.
- 8. ASTM C67 Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
- 9. ASTM C126 Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units.
- 10. ASTM C216 Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).
- 11. ASTM C270 Standard Specification for Mortar for Unit Masonry.
- 12. ASTM C652 Standard Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale).
- 13. ASTM C1088 Standard Specification for Thin Veneer Brick Units Made from Clay or Shale.
- 14. ASTM C1405 Standard Specification for Glazed Brick (Single Fired, Brick Units).
- 15. ASTM D1056 Standard Specification for Flexible Cellular Materials -Sponge or Expanded Rubber.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 Administrative Requirements.
- B. Clay Brick: Manufacturer's letter of certification, including:
 - 1. Test reports.
 - 2. Cleaning recommendations.
- C. Other Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- D. Samples: Furnish not less than five individual brick as samples, showing extreme variations in color and texture.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 5 years manufacturing similar products.
- B. Installer Qualifications: Minimum 2 years installing similar products.
- C. Brick Tests: Sample and test shall be in accordance with ASTM C67.
- D. Certificates: Before delivery, submit to Architect/Engineer certificates attesting compliance with the applicable specifications for grades, types, or classes included in these specifications.

E. Costs of Tests: The cost of tests shall be borne by the purchaser unless tests indicate that units do not conform to the requirements of the specifications, in which the seller shall pay the case cost.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store brick off the ground to prevent contamination by mud, dust, or other materials likely to cause staining or other defects.
- C. Cover all materials with a non-staining waterproof membrane material when necessary to protect from elements.
- D. Store different types of materials separately.

1.07 PROJECT CONDITIONS

- A. Protection of Work:
 - 1. Wall Covering:
 - a. During construction, cover the top of the wall with a durable nonstaining waterproof membrane at the end of each day or shutdown.
 - b. Cover partially completed walls when work is not in progress.
 - c. Extend cover minimum of 24 inches (610 mm) down both sides.
 - d. Hold the cover securely in place.
 - 2. Load Applications:
 - a. Do not apply uniform floor or roof loading for at least 12 hours after building masonry columns or walls.
 - b. Do not apply concentrated loads for at least three days after building masonry columns or walls.
 - 3. Stain Prevention:
 - a. Prevent grout or mortar from staining the face of the masonry.
 - b. Remove grout or mortar immediately in contact with the face of such masonry.
 - c. Protect all sills, ledges, and projections from droppings of mortar.
 - d. Protect the base of the wall from rain-splashed mud and mortar splatter.
 - e. Scaffold boards shall be turned on edge when work is not in progress.
- B. Hot Weather Protection:
 - 1. Construction Requirements While Work is Progressing:
 - a. When the temperature exceeds 100 degrees F or 90 degrees F with 8 mph wind (above 38 degrees C or 32 degrees C with 13 kms/h wind).
 - 1) Maintain the temperature of mortar and grout between 70 degrees F and 120 degrees F (21 degrees C and 49 degrees C).

- i) Limit spread of mortar bed to 4 feet (1.2 m). Place units within 1 minute of spreading mortar.
- 2) Partially or recently completed walls may be fog sprayed and/or covered with opaque plastic or canvas or both to control moisture evaporation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Belden Brick Company (The); Canton, OH
- B. Glen-Gery Corporation; Wyomissing, PA
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 Product Requirements.
- D. For all other products in this section, specify the desired manufacturer.

2.02 CLAY MASONRY UNITS

- A. All brick specified and shown on drawing shall be Belcrest 530 as Manufactured by The Belden Brick Company.
 - 1. Thin Veneer Brick: ASTM C 1088.
 - a. Grade Exterior.
 - b. Type TBA.
 - c. Size: 3/4" x 2-1/4" x 7-5/8" inches.
 - 2. Shapes: Flat Brick and External Corners.
- B. Maximum Initial Rate of Absorption (IRA): 30grams per 30 square inches per minute.
- C. Provide brick similar in texture, color, and physical properties to those available for inspection at the Architect/Engineer's office and/or as supplied on the approved sample panel.
- D. All brick supplied shall be pre-blended by the manufacturer.

2.03 FLASHING

A. Stainless Steel: ASTM A 666, Grade 304, Type 304.

2.04 ACCESSORIES

- A. Weepholes:
 - 1. Rope Wicks: Cotton Sash Cord, 12 inches long with end laid in a cavity.
 - 2. Plastic Tubes: 1/4 inch (6 mm) minimum inside diameter by 4 inches (102 mm) long.

- 3. Aluminum Weep/Vents.
- 4. Plastic Weep/Vents.
- B. Concrete Pier Cap:
 - 1. Concrete Designs, Inc; Tucson, Arizona
 - a. PC 104 28sq Half
 - b. Texture: Etched
 - c. Color: To be selected by Architect

2.05 MORTAR

A. Mortar shall conform to ASTM C 270 under the guidelines provided in BIA Technical Notes No. 8 Series.

2.06 WATER-RESISTIVE BARRIER

- A. Dupont:
 - 1. Tyvek CommercialWrap "D"
 - 2. Tape for seams Tyvek 3" seam tape
 - 3. Tyvek FlexWrap around openings
 - 4. Tyvek Wrap Caps (on steel studs only)
 - 5. Or approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify the Architect of inadequate preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to before installation.
- B. Cleaning Reinforcement: Remove mud, loose rust, ice, and other coatings from reinforcement that would interfere with the bond.
- C. Prepare surfaces using the methods recommended by the manufacturer to achieve the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. For thin brick, install following the manufacturer's thin brick system or adhesive manufacturer's instructions.

3.04 BONDING

A. Lay masonry in bond pattern as indicated on drawings or general notes. Reference BIA Technical Note 30 for additional requirements.

3.05 LAYING MASONRY

- A. Lay masonry with full head and bed joints.
- B. Lay all brick plumb and true to lines.
- C. Where fresh mortar joins partially set mortar, remove loose brick and mortar, and lightly wet exposed surface of set masonry.
- D. Toothing shall be subject to approval by the Architect/Engineer.
- E. When adjustment is necessary to be made after mortar begins to harden, remove hardened mortar, and replace it with fresh mortar.

3.06 TOOLING AND POINTING

- A. Joint Profile: Tool mortar joints to a concave appearance.
- B. Tool exposed joints when "thumb-print" hard.
- C. Flush cut all joints not tooled.
- D. When pointing, rake mortar joints to a depth of not less than 1/2 inch (12 mm). Fill solidly with pointing mortar. Tool joints.

3.07 FLASHING

- A. Clean from masonry surface any projections that might puncture flashing.
- B. Place through-wall flashing on a bed of mortar. Cover flashing with mortar.
- C. Flashing shall extend to the exterior wall surface with the back edge turned up at least 3-1/2" vertically.
- D. Direct the flashing/weep screed between the two layers of water-resistive barrier.
- E. Lap flashing a minimum of 6 inches (152 mm).
- F. Leave flashing project from the face of the wall approximately 1/4 inch (6 mm) to form a drip. Flashing shall be cut back to the face of the wall after inspection if the drip is deemed objectionable by the Architect.

3.08 WEEPHOLES

- A. Provide weepholes in head joints of the first brick course immediately above flashing by placing weeps no more than 24 inches (610 mm) on the center horizontally.
- B. Keep the cavity free from mortar droppings.

3.09 EXPANSION JOINTS

A. Keep clean from all mortar and debris. Locate as shown on drawings. Install neoprene pre-molded foam pad, backer rod, and sealant. Prime surfaces if necessary.

3.10 CLEANING

- A. Cut out all defective mortar joints and holes in exposed masonry and provide new mortar.
- B. Clean pre-selected sample wall area. Do not proceed with cleaning until approved by Architect.
- C. Clean brick as outlined in BIA Technical Note 20.
- D. All cleaning practices and products used shall follow the cleaning products manufacturer's printed instructions.
- E. For waxed thin brick, clean with 130 degrees F water using clean water and a low-pressure washer.

END OF SECTION 04 21 00

REINFORCED CONCRETE UNIT MASONRY SECTION 04 22 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1;
 - 2. Concrete unit masonry work;
 - 3. Mortar and grout in connection with the installation of concrete block;
 - 4. Placement of steel reinforcing for concrete block;
 - 5. Supervision of dowel installation in concrete work;
 - Setting and incorporating into the concrete block of all accessories, sheet metal work, miscellaneous iron, anchor bolts, etc. furnished by other trades;
 - 7. High-lift or low-lift grout mix designs;
 - 8. Associated hardware;
 - 9. Submittal preparation;
 - 10. Clean up.
- B. Related Sections:
 - 1. Section 03 21 00: Reinforcing Steel
 - a. Furnishing of reinforcing steel and installation of steel dowels cast in concrete for concrete block.
 - 2. Section 03 31 00: Structural Concrete Work
 - a. Footings for masonry walls.
 - 3. Section 05 12 00: Structural Steel
 - a. Furnishing of accessories, misc. steel, etc., incorporated into concrete block.
 - 4. Section 06 10 00: Rough Carpentry
 - a. Forms, shoring and centering for masonry work.

1.02 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM A36 Standard Specification for Carbon Structural Steel.
 - 2. ASTM A82 Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - 3. ASTM A153 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 4. ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - 5. ASTM A775 Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
 - 6. ASTM A996 Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.

- 7. ASTM B370 Standard Specification for Copper Sheet and Strip for Building Construction.
- 8. ASTM C67 Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
- 9. ASTM C140 ASTM C140/C140M Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units; 2018.
- 10. ASTM C426 ASTM C426 Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units; 2016.
- 11. ASTM C270 Standard Specification for Mortar for Unit Masonry.
- 12. ASTM C652 Standard Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale).
- 13. ASTM D1056 Standard Specification for Flexible Cellular Materials Sponge or Expanded Rubber.

1.03 SUBMITTALS

- A. Samples or Mock-ups:
 - 1. Submit one (1) sample of the manufacturer's complete custom color range to the Architect for color selection purposes prior to ordering material.

1.04 QUALITY ASSURANCE

- A. Tests and Inspections:
 - 1. Tests and Inspections shall be per Section 01 45 23 "Tests and Inspections".
 - 2. Continuous inspection of masonry shall be performed by special inspector approved by DSA during laying and grouting.
- B. Concrete Masonry Units:
 - Furnish manufacturer's certificate attesting that units delivered to site meet material and property requirements specified, including linear shrinkage requirements; otherwise, concrete masonry units shall be sampled from material delivered to the site by the testing laboratory or project inspector, and tested by the testing laboratory as specified in ASTM C140 for compliance, and tested for linear shrinkage according to ASTM C426. Testing shall be completed, and the units approved prior to placing units in the work.
 - 2. Tolerances:
 - a. Unit masonry shall be placed within one-eighth (1/8") of noted dimensions.
 - b. Reinforcement shall be placed within tolerances recommended by ACI Detailing Manual Special Publication, SP-66.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Basalite Concrete Products, LLC, dba Basalite Selma, contact rep: David Willis e-mail: david.willis@paccoast.com, (559) 896-1649.
 - 2. Angelus Block Co., Inc, Bakersfield, contact rep: Roger Beckett, e-mail: info@desertblock.com, (661) 858-2072.
 - 3. Or approved equal.

2.02 MATERIALS

- A. Concrete Block:
 - 1. Concrete block shall comply with per ASTM C90, Type I, medium weight Requirements.
 - a. Color shall be as directed by Architect
 - b. Types and size of block shall be as shown on drawings.
 - c. Block mix shall have a water repellant admixture, SPG # VL 25/25 or BASF Rheopel Plus.
- B. Portland Cement:
 - 1. Portland cement shall conform to ASTM C-150, Type II, with the following exceptions:
 - a. The cement shall not contain more than 0.60 percent total alkali when calculated as Sodium Oxide.
 - b. The percentage of Tricalcium Silicate is not limited.
- C. Grout:
 - 1. Comply with ASTM C476, Coarse Aggregate
 - 2. Coarse grout proportioned by weight shall contain not less than 564 pounds of cementitious material per cubic yard.
 - 3. Strength: 2000 psi at 28 days.
 - 4. Sika Grout Aid Type II shall be used in grout.
- D. Hydrated Lime:
 - 1. Hydrated lime shall conform to Type S per ASTM C270.
- E. Water:
 - 1. Water shall be clean, free from deleterious acids, alkali, oil, and organic matter.
- F. Reinforcing Steel:
 - 1. Refer to Section 03 21 00 "Reinforcing Steel".

- G. Mortar:
 - 1. Mortar Type "S" per ASTM C270, proportions based on loose volumes:
 - a. Portland Cement: 1 part
 - b. Hydrated lime or lime putty: 1/4 part (min.)
 - c. Sand (damp, loose volumes): Not less than 2 1/4 and not more than 3 times the sum of the separate volumes of cementitious materials.
 - 2. Pre-mixed Mortar Type "S" per ASTM C270
 - a. Amerimix
 - b. Spec-Mix
 - c. Or approved equal
 - 3. Mortar shall have a water repellant admixture; SPG # VL 25/25 or BASF Rheopel Plus.
 - 4. Mortar Strength:
 - a. Mortar shall attain a minimum compressive strength of 1800 psi at 28 days.
 - 5. Mortar Color:
 - a. As selected by Architect.

PART 3 EXECUTION

3.01 EXAMINATION

A. Start of work shall be considered as acceptance of existing conditions.

3.02 PREPARATION

A. Masonry units shall be clean and free from dust, grease, or other objectionable material.

3.03 DELIVERY, STORAGE, AND HANDLING

- A. Cement shall be stored in such a manner as to protect it from inclusion of foreign material and damage by moisture.
- B. Only one (1) brand of cement shall be used for this work.

3.04 INSTALLATION OR APPLICATION

A. Install per the manufacturer's latest written recommendations.

B. Joints

- 1. Block shall be laid with three-eighths inch (3/8") minimum thick mortar bed on entire horizontal surface of block.
- 2. Solidly fill head joints.

- Mortar joints shall be straight, clean, and uniform in thickness and shall be tooled with a steel rod as required to obtain a concave-rodded joint.
 a. Produce a dense joint surface well-bonded to the block at the edges.
- 4. Walls to receive plaster, or in concealed locations, shall have flush struck joints.
- 5. Joints to be concealed under paint shall be filled flush and then sacked to produce a dense surface without sheen.
- C. Alignment:
 - 1. Block shall be laid in running bond, unless otherwise indicated.
 - 2. Block shall be laid in a manner that preserves an unobstructed vertical continuity of the cells to be filled.
 - 3. Remove overhanging mortar or other obstruction from inside the cells and from the reinforcing.
- D. Mortar:
 - Materials for mortar shall be measured in suitable calibrated devices.
 a. Shovel measurements will not be accepted.
 - 2. Lime shall be the last material added to the mix.
 - 3. Mix for at least 3 minutes in a mechanical batch mixer.
 - 4. Re-tempering of mortar shall be done only by adding water into a basin made with the mortar.
 - a. Carefully work the water into the mortar.
 - b. Mortar that is non-plastic or over 1-1/2 hours old shall not be used.
- E. Placing of Reinforcement:
 - 1. Clean reinforcement to be free of mortar, oil, dirt, loose mill scale, excessive rust, or other coatings that would destroy or reduce the bond.
 - Bends shall be made around a pin having a diameter of not less than four (4) times the bar diameter for stirrups and ties and six (6) times the bar diameter for other bars, except for bars larger than one-inch (1") which shall be eight (8) times the bar diameter.
 - a. Bars shall be bent cold.
 - 3. Reinforcing shall be accurately placed.
 - 4. Reinforcing shall be fully embedded in grout.
 - a. Do not embed in mortar or mortar joints, except for wall mesh as indicated on the drawings.
 - 5. Maintain one-half inch (1/2") minimum clearance between any bar and masonry.
 - 6. Where the low-lift grouting method is used, the vertical bars shall be placed prior to the erection of the wall and shall be held in position at top and bottom, and at intervals not exceeding 192 diameters of the reinforcement with at least No. 16 gauge annealed wire.
 - 7. Reinforcement that will be included in a grout pour shall be positioned and wired in place before the cells are grouted.

- a. It is not permissible to "stick" the bars in the grout.
- 8. High Lift Grout Method:
 - a. Both horizontal and vertical reinforcing shall be held in position by wire ties or spacing devices near ends and at intervals not exceeding one hundred sixty (160) diameters of the reinforcement.
 - b. Horizontal reinforcing shall be placed as the work progresses and the vertical reinforcing may be dropped into position after the completion of the laying if adequate positioning devices are provided to hold the reinforcement.
- F. Dowels:
 - 1. Supervise and be responsible for the proper installation of reinforcing dowels by others.
 - a. Dowels shall not be bent to obtain the proper alignment.
- G. Splicing:
 - 1. Splices shall be made with a lap of at least seventy-two (72) bar diameters, unless otherwise noted.
 - 2. Bars shall be placed in contact and wired together to maintain proper clearances.
 - 3. Stagger horizontal splices at least four feet (4'-0").
 - 4. No splices in the vertical reinforcement will be allowed, unless shown on the drawings
- H. Embedded Items:
 - 1. Cooperate with other tradesmen to ensure that conduit, anchor bolts, sleeves, inserts, hangers, hollow metal door frames, etc., are properly installed and secured in the correct position.
 - 2. Embedded items shall be thoroughly clean and free from rust, scale, oil, or other foreign matter.
 - 3. Do not embed pipes, other than electrical conduit.
 - a. Rigid electrical conduit may be embedded in structural masonry where indicated on the approved drawings
 - 4. Accurately secure embedded and secure items set in place before the grouting of the cells is started.
 - a. Set bolts in place by using a wood template.
 - 5. Bolts shall be grouted in place, with not less than one inch of grout between the bolt and the masonry.
- I. High Lift Grouting:
 - 1. The method of grouting, either the high lift or the low lift method, shall be as specified.
 - 2. The high lift method shall conform to the provisions of Title 24, Section 2104A.1.3.1.1.1.2, and IR 21-2, Division of the State Architect, Structural Safety Section.

- 3. Contact surface of all foundations that are to receive masonry work shall be cleaned and roughened in accordance with Section Construction Joints of Section 03 31 00 "Structural Concrete Work", or by sand blasting.
- 4. Cleanout openings shall be provided for all cells.
- A sand blanket shall be provided over the exposed surface of the foundation to prevent mortar droppings from bonding to it.
 a. Remove sand blanket prior to grouting.
- 6. Mortar overhangs and droppings shall be removed from the cell walls and the reinforcing by rodding.
- 7. When stacked bond is used, wire ties shall be embedded in the horizontal mortar joints across continuous vertical joints to prevent "blow-outs."
- 8. Grout mix shall be prepared by a Testing Laboratory and approved by the Structural Engineer before grouting is started.
 - a. Contractor shall pay for the cost of the grout mix design.
 - b. Grout mix shall be based on the following proportions:
 - 1) Material: Cement
 - a) Proportions: 1
 - 2) Material: Sand
 - a) Proportions: 3
 - 3) Material: Pea Gravel
 - a) Proportions: 1.5 to 1.8 (Aggregates measured in a damp, loose volume)
 - c. Minimum Cement Content: 6.3 sacks per cubic yard.
 - d. Required Admixture: Sika Grout Aid (6#/cu. yd.), BASF Rheopel
 - e. Slump: Nine (9) to ten (10) inches
- 9. Grouting shall be done in one (1) continuous operation from the top of the footing to top of wall in two-foot (2'-0") lifts.
 - a. The maximum height of grout poured in one workday (8 hours) shall be as follows for size of unit indicated:
 - 1) Eight-inch (8") units: Twelve feet (12').
 - 2) Twelve-inch (12") units: Sixteen feet (16').
 - b. No horizontal construction joints are permitted, but vertical construction joints can be used in locations approved by the Engineer.
 - c. Each lift of grout shall be vibrated with a mechanical vibrator.
 - d. There shall be a waiting period of one half (1/2) to one (1) hour between lifts to allow each lift to consolidate before pouring the next lift.
 - e. In vibrating the upper lifts, the vibrator shall be dropped down twelve inches (12") to eighteen inches (18") into the preceding lift in alternate cells to reconsolidate it.
 - f. The top lift shall be reconsolidated also after the waiting period and topped off with grout.
- 10. Grout shall attain a minimum compressive strength of 2000 psi at 28 days.
- 11. During construction, the ungrouted walls shall be adequately braced against wind and other forces.

- 12. During construction, the ungrouted walls shall be adequately braced against wind and other forces.
- J. Low Lift Grouting:
 - 1. The method of grouting, either the high lift or the low lift method, shall be as specified. Low lift grouting shall conform to Title 24, Section 2104A.5.1.2.1.1.
 - 2. Proportioning:
 - a. Material: Cement
 - 1) Proportions: 1
 - b. Material: Sand
 - 1) Proportions: 2.25 to 3.0
 - c. Material: Pea Gravel
 - 1) Proportions: 1.0 to 2.0 (Aggregates measured in a damp, loose volume)
 - 3. Required Admixture: Sika Grout Aid Type II, BASF Rheopel Plus
 - 4. Add water in the amount necessary to cause the grout to flow into all joints of the masonry without segregation.
 - 5. Grout shall attain a minimum compressive strength of 2000 psi at 28 days.
 - 6. Fill all cells with grout in lifts not exceeding 4'-0" in height.a. Masonry units shall not be laid more than 4'-0" in height before grouting.
 - 7. If grouting is stopped for one hour or more, horizontal construction joints shall be formed by stopping the grout 1 $\frac{1}{2}$ " below the top of the unit.
 - 8. Grouting of beams over openings shall be done in a continuous operation.
 - 9. Grout shall be rodded with a heavy reinforcing bar or vibrated with a mechanical vibrator immediately after placing.
 - 10. Hollow metal door and window frames shall be grouted in place. Coordinate with frame supplier for positioning of metal frame ties.

3.05 CLEANING OR REPAIR

- A. Use care to keep the masonry clean.
 - 1. Mortar dropped or spattered on the work shall be removed immediately, and the surface washed clean.
- B. Remove all surplus material, equipment, and debris from the premises which result from this operation.

END OF SECTION 04 22 00

STRUCTURAL STEEL SECTION 05 12 00

PART 1 GENERAL INFORMATION

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1;
 - 2. Fabrication and erection of structural steel framing and miscellaneous steel work;
 - 3. Welding;
 - 4. Erection bracing as needed;
 - 5. Shop priming, painting protective finishes, and touchup painting of damaged prime-coated areas;
 - 6. Submittal preparation;
 - 7. Samples for testing;
 - 8. Protection of this work and adjacent work;
 - 9. Cleanup.
- B. Related Sections:
 - 1. Section 03 31 00: Structural Concrete Work
 - 2. Section 04 22 00: Concrete Unit Masonry
 - 3. Section 32 13 13: Site Concrete
 - 4. Division 26: Basic Electrical Materials and Methods
- C. References:
 - 1. Structural Welding Code of the American Welding Society (AWS), latest edition.
 - 2. Manual of Steel Construction by American Institute of Steel Construction (AISC), latest edition with the following addenda:
 - a. Omit Section 3 Design Drawings and Specifications and any reference thereto from the Code of Standard Practice for Steel Buildings and Bridges.
 - 3. California Code of Regulations (CCR) Title 24 California Building Code (CBC).
 - 4. SSPC Paint 15 Steel Joist Shop Primer; Society for Protective Coatings.
 - 5. SSCP Paint 20 Zinc-Rich Primers (tupe 1, "Inorganic," and Type II, "Organic"); Society for Protective Coatings.
 - 6. UL (FRD) Fire Resistance Directory; Underwriters Laboratories, Inc.
 - 7. American Society for Testing and Materials (ASTM).
 - 8. ASTM A36/A36M Standard Specification for Carbon Structural Steel.
 - 9. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 10. ASTM A108 Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.

- 11. ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- 12. ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- 13. ASTM A325 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- 14. ASTM A449 Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use.
- 15. ASTM A500 Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- 16. ASTM A501 Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- 17. ASTM A992/A992M Standard Specification for Structural Steel Shapes.
- 18. ASTM E94 Standard Guide for Radiographic Examination.
- 19. ASTM E164 Standard Practice for Ultrasonic Contact Examination of Welded Elements.

1.02 SUBMITTALS

- A. Product and/or material data as required by DSA.
 - 1. Certified Mill Test Reports:
 - a. Structural steel (each type) indicate chemical, physical properties, destructive test analysis, and non-destructive test analysis.
- B. Shop Drawings:
 - 1. Submit 5 sets of shop drawings, including complete details and schedules for fabrication and shop assembly of members, and details, schedules, procedures, and diagrams showing the sequence of erections. Fully detail minor connections and fastenings not shown or specified in the Contract Documents to meet required conditions using similar details as shown in the Contract Documents. Include a fully detailed, well controlled sequence and technique plan for shop and field welding that minimizes locked-in stresses and distortion; submit sequence and technique plan for review by the Architect.
 - a. Include details of cuts, connections, camber, holes per Figure 5.2 of AWS D1.1 or AISC Section J1.8, weld position plan and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld.
 - b. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed for work specified in other sections.
 - c. Shop drawings shall use the "United States Standards" system dimensioning (feet, inches, etc.). Shop drawings which use only metric system of measurements will be rejected.
 - d. Shop drawings shall be drawn on sheet sizes not less than 24" x 32".
 - e. During the shop drawing submittal phase, if the Contractor cannot establish approved document within two submissions, he will assume

the responsibility for the additional cost incurred by the Architect for the additional reviews.

- f. No deviation of structural details or framing shall be made in the shop drawings without prior approval by Building Department and the Architect.
- g. All approved deviations from the contract documents thru Request for Information (RFI) process shall be referenced on the shop drawings with appropriate RFI numbers.
- h. Maximum number of shop drawing sheets in any submittal shall not exceed 200 for a minimum two week review period by the structural engineer. The review period for additional submittal will begin at the end of the previous submittal review.
- i. Erection and Bracing Plan and Erection Procedure:
 - Employ a Professional Engineer licensed in the state where the project is located to prepare an erection and framing plan, including columns, beams, and girders. This engineer shall be solely responsible for compliance with the plans. Keep a copy of this submittal at site. The plan shall follow the minimum procedures described below. Provide descriptive data to illustrate structural steel erection procedure, including the following:
 - (a) Equipment and method to be used in structural steel erection.
 - (b) Sequence of erection.
 - (c) Temporary guying and bracing required during erection prior to making permanent connection.
 - (d) Provisions to be made for stresses resulting from loads imposed by piles of materials, erection equipment or other loads on the framing during erection.
 - (e) Extent of completion and guying required for the immediate floors between the floors being erected and the concrete poured floors.
 - 2) List of beams to be galvanized.
 - 3) List of stress relieved joints.
- C. Administrative Requirements:
 - 1. For submittal procedures, allow a minimum of 30 days for approval of shop drawings.
- D. Product Data:
 - 1. Submit copies of producer's or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data required to show compliance with these specifications (including specified standards).
 - a. Welding electrodes.
 - b. Welding gas.
 - c. Structural steel primer paint.

1.03 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Comply with DSA regulations.
- B. Qualifications:
 - 1. Contractor shall determine, warrant, and certify that producer, detailer, fabricator, erector, materials suppliers and all other involved in the Work of this Section with minimum five year documented experience for at least five buildings 5 stories or more in height.
- C. Weld Procedures:
 - 1. Contractor shall submit all welding procedures, stamped and signed by a professional engineer licensed in the state where the project is located, for review by the Owner's testing and inspection firm, the structural engineer of record, and the Building Department. Weld procedures shall be qualified as described in AWS D1.5, Section 5.12 or 5.13. All CJP single and/or double groove welds shall be back gouged, unless otherwise noted on the drawings. Weld procedure shall indicate joint details and tolerances, back gouge, preheat and interpass temperature, postheat treatment, single or multiple stringer passes, peening of stringer passes for groove welds, except for the first and the last layers, electrode type and size, welding current polarity and amperes and root treatment. The welding variables for each stringer pass shall be recorded and averaged, from these averages the weld heat input shall be calculated.
- D. Test Reports:
 - 1. Submit copies of test conducted on shop and field welds and bolted connections. Include data on type of tests conducted and test results.
- E. Provide Procedure Qualification Record (PQRs). For all qualification tests of FCAW in the horizontal position, use 2-1/2 inch thick plate and for the vertical position one inch thick plate shall be used. All PQR shall be in accordance with AWS D1.5.
- F. Welders Certificates:
 - 1. All field welders shall be job certified per AWS D1.1. All shop welders shall be job certified for FCAWS per AWS D1.1.
- G. Submit Manufacturer's Certificates, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months. All welders welding material with a thickness of one and one half (1-1/2) inches or greater shall be recertified for this project in accordance with AWS D1.1 requirements. (or shall be certified within the past 12 months and has welded this type of material within the past 3 months.)
- H. Stress Relieving Method.
- I. Fabricator:
 - 1. AISC certified shop for complex structures specializing in performing the work of this Section with minimum five year documented experience in

fabrication of structural steel for at least five buildings 5 stories or more in height.

- J. Erector:
 - 1. Company specializing in performing the work of this Section with minimum five year documented experience in the erection of structural steel for at least five buildings 5 or more stories in height.
- K. Qualifications:
 - 1. Welding shall be done only by AWS qualified welders approved by the welding inspector.
- L. Quality Assurance:
 - 1. Fabricate structural steel members in accordance with AISC "Manual of Steel Construction" in AISC certified shop.
 - 2. Comply with Section 10 in AISC "Code of Standard Practice for Steel Buildings and Bridges," for architecturally exposed structural steel.
 - 3. Maintain one copy of each document on site.
 - 4. Fabricator:
 - a. AISC certified shop for complex structures specializing in performing the work of this Section with minimum five year documented experience in fabrication of structural steel for at least five buildings 5 stories or more in height.
 - 5. Erector:
 - a. Company specializing in performing the work of this Section with minimum five year documented experience in the erection of structural steel for at least five buildings 5 or more stories in height.
 - 6. Weld procedures for non-rigid frame connections shall be qualified and must be reviewed and approved by the Architect and by the governing agency.
 - 7. Continuous inspection by an Inspector of Record hired by the Owner and approved by the Architect and governing agency will be provided during fabrication.
 - 8. To assure the proper amperage and voltage of the welding process, the use of the hand-held calibrated amp and volt meter shall be used. The handheld amperage and volt meters shall be calibrated at the start of each shift or once a day as a minimum. This equipment shall be used by the fabricator, erector, and the inspectors. Amperage and voltage shall be measured near the arc. Travel speed and electrode stick out shall be verified to be in compliance with the approved welding procedures.
 - 9. Inspection agency approved by the Architect and by the governing agency will perform visual inspection of all welds.
 - 10. Contractor's Responsibility:
 - a. The Contractor alone shall be responsible for correct fitting of structural members and the elevation and alignment of the finished structure. The Contractor shall be responsible for establishing, setting, and maintaining control points and building lines to be used in plumbing the structural steel frame in accordance with AISC Code of Standard
Practice, Section 7.11, and shall verify the following:

- 1) Verify that anchor bolts are located as specified on the Drawings and are in proper relation to the control points and building lines, prior to setting of structural steel.
- 2) Verify that structural steel members have been located, elevated, plumbed, and aligned in relation to the control points and building lines, within the tolerance permitted by AISC Code of Standard Practice, Section 7.11, and as specified in Section 3.3. Any adjustments necessary in the steel frame because of fabrication, construction, or erection discrepancies in elevations and alignment shall be the responsibility of the Contractor.
- 3) At the location identified by Floor, record steel elevations prior to, and after the completion of concreting operations. Readings shall be taken from below the steel members. Locations of readings shall be marked in a manner which will allow subsequent elevations to be taken at the same points. These data shall be submitted to the Architect for review.
- 11. Survey Work:
 - a. Contractor shall employ a registered surveyor to establish control points and layout work for the Building Control Lines. The Contractor shall conduct layout work and elevations for erection of structural steel.
 - b. Check elevations of concrete and masonry bearing surfaces and anchor bolt locations prior to erection and submit any discrepancies to Architect prior to start of erection. Corrections or adjustments to the structural steel shall be made and submitted for approval prior to start of erection.
 - c. Upon completion of erection of steel frame and before the start of work specified in other sections that are supported, attached, or applied to the frame, make a final survey of the frame, and submit a report to the Architect within 3 days certifying compliance with the specified tolerances.
- 12. Codes and Standards:
 - a. Comply with Paragraph 1.4 and provisions of the following, except as otherwise indicated:
 - 1) AISC "Code of Standard Practice for Steel Buildings and Bridges."
 - (a) Paragraph 4.2.1 of the above Code is hereby modified by deletion of the following sentence: "This approval constitutes the Owner's acceptance of all responsibility for the design adequacy of any connections designed by the fabricator as part of his preparation of these shop drawings.
 - (b) Paragraph 4.4.2 delete in its entirety.
 - (c) Paragraph 7.9.3 of the above code is hereby modified by deletion of the following words: "The contract documents specify the sequence and schedule to placement of such elements."
 - 2) AISC "Specifications for the Design, Fabrication, and Erection of

Structural Steel for Buildings" and including the Commentary and Supplements thereto as issued.

- 3) AWS D1.1 "Structural Welding Code."
- 4) ASTM A-6 "General Requirements for Delivery of Rolled Steel Plates, Shapes. Sheet Piling and Bars for Structural Use."
- 13. Qualifications for Welding Work:
 - a. Qualify welding processes and welding operators in accordance with the AWS "Procedures Qualification" and Welder Qualification."
- 14. Source Quality Control:
 - a. Materials and fabrication procedures are subject to inspection and test in mill, shop, and field, conducted by a qualified inspection agency appointed by the Architect. Such inspections and tests will not relieve contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
- 15. Testing Laboratory shall perform conformance testing in accordance with the applicable codes and the following:
 - a. Identified Structural Steel:
 - Steel shall be identified in accordance with ASTM A6 and bear legible heat numbers acceptable to the Testing Laboratory which shall make positive identification of structural steel as to mill source, heat numbers, and certified mill analysis and test report for each heat. Obtain the mill test reports, and furnish report certifying identity of steel.
 - b. Unidentified Structural Steel:
 - Steel not identified and certified as specified above shall be tested according to the following requirements. Structural steel fabricator shall cut samples under direction of the Testing Laboratory. Testing Laboratory shall machine or otherwise prepare the specimens, and perform testing of each 5 tons or fraction thereof, for each size of unidentified steel, except in the case of random pieces or steel having Fy equal to or greater than 36 ksi, testing of each piece is required. Tests required are:
 - (a) For pipe, one tension and elongation test and one flattening test of each size.
 - (b) For all other steel, one tension and elongation test and one bend test for each size.
 - (c) Additional test may be required for quantity when deemed necessary by the Architects or by the governing agency.
 - (d) Contractor shall reimburse to the Owner all costs paid by the Owner for testing unidentified steel.
 - c. For all other identified steel having Fy equal to or greater than 36 ksi, one tension and elongation test and one bend or flattering test, as applicable, for each heat plus steel manufacturer's certified mill analysis and test report as specified above shall be performed.
 - d. Promptly remove and replace materials or fabricated components which do not comply.

- 16. Design of Members and Connections:
 - a. Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work. Promptly notify the Architect whenever possible without causing delay in the work. Promptly notify the Architect whenever design of members and connections for any portion of structure are not clearly indicated.
- 17. For Exposed Structural Steel:
 - a. Perform work in accordance with AISC Specification for Architectural Exposed Structural Steel.
- 18. Preheat and Interpass Temperatures:
 - a. The preheat temperatures and conditions given in AWS D1.1, Chapter 3, shall be strictly observed with special attention given to Paragraph 3.5 for the thickness of the material to be welded.
 - b. Preheat temperatures should be measured at a distance from the weld equal to the thickness of the part being welded, but not less than three inches in any direction, including the through thickness of the piece. Where plates are of different thickness, the pre-heat requirements for the thicker plate should govern. Maintenance of pre-heat temperatures through the execution of the weld (i.e. the interpass temperature) is essential. Maximum interpass temperature should be limited to 550 degrees Fahrenheit for all complete joint penetration welds. Welding operators and inspectors shall be in possession of and utilizing temperature measure devices. Temperature indicating sticks may be used.
- 19. When ambient temperature drops below 50°F or under circumstances where the wind chill at higher temperature would increase the heat loss to be equivalent to a temperature of 50°F controlled cooling shall be provided by wrapping insulating blankets over the welded assembly immediately after completion of welding.
- 20. Stress relieving shall be provided for both shop and/or field welded assemblies identified on the drawings using one of the following methods:
 - a. Thermal using an oven (in accordance with AWS D1.1).
 - b. Thermal using localized heating with insulation blankets.
 - c. Mechanical using vibration with use of stabilization.
 - d. Whichever method is used, the proposed procedure shall be reviewed and approved by the Engineer of Record prior to start of work and the company doing the work must be approved by the Engineer of Record.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide materials of type and grade indicated on the Drawings.
- B. Shop and Touch-Up Primer:
 - 1. Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

- C. Touch-Up Primer for Galvanized Surfaces:
 - 1. Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.
- D. All steel shall be manufactured using fully killed fine grain practice yielding grain size numbers 5 or greater as determined by ASTM E-112. Provide verification of fine grain practice in the mill certificates.
- E. All base metal that occurs within a distance of 6 inches above the top of joint to 6 inches below the bottom of joint (inclusive) for the column and extending along the beam 6 inches past the ends of the joint (ends of cover plates) assembly shall be ultrasonically tested for laminations per ASTM A898-91.
- F. Materials shall be ordered of sufficient size to allow for testing described in this Section.
- G. Structural Steel Shapes and Plates:
 - 1. Structural Shapes:
 - a. Structural wide flange shapes shall conform to "Specification for Structural Steel" ASTM A-992.
 - b. All other shapes, plates, etc. shall conform to "Specification for Structural Steel" ASTM A-36.
 - 2. Square and Rectangular Tubing:
 - a. Conform to "Specification for Structural Steel" ASTM A-500, Grade B.
- H. Welding Electrodes:
 - 1. Conform to AWS Welding Code E-70XX, E70-T6 or E70-T8.
 - 2. Electrodes welding to grade 50 steel shall be low hydrogen type.
- I. Welding Materials:
 - AWS D1.1; type required for materials being welded. All welding electrodes shall be low hydrogen and shall have a minimum Charpy V-notch toughness of 20 ft. lbs. at minus 20-degrees Fahrenheit per AWS. Use of FCAW T4 wire is specifically prohibited.
 - 2. Electrodes for flux cored arch welding (FCAW) shall not have a diameter greater than 7/64 inch and an electrical stick out greater than two inches.

2.02 FINISH

- A. Galvanizing:
 - 1. Conform to ASTM A123 and A153.
 - 2. Touch-up galvanizing "Galvalloy," Metalloy Products Company, Inc., or equal.
- B. Shop Priming Paint:
 - 1. Sherwin Williams, Kromik metal primer or equal.
 - a. Meet Fed. Spec. TT-F-86.

PART 3 EXECUTION

3.01 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals to insure uninterrupted progress of work. Protect all steel materials from damage during shipping, handling, and storage on the site. Steel showing dents, creases, deformations, weathering, or other defects is not acceptable. Deliver welding electrodes to site in unbroken packages bearing the manufacturer's name and label identifying the contents.
 - 1. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to not delay that work. Anchor bolts and template delivery shall be indicated as a milestone date on the project construction schedule.
- B. Storage of fabricated steel at the site shall be the responsibility of the Contractor. Store materials to permit easy access for inspection and indentification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and package materials from corrosion and deterioration.
- C. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as required by the Architect.
- D. Other material shall be stored in weather-tight containers until ready for use in the Work. Containers must be stored in a dry place.
- E. The Architect reserves the right to reject any material that has become damaged because of improper storage.
- F. Storage areas must be shown on the current site use plan.
- G. High strength bolts and certificates shall be identified, stored, and tracked at the site until they are installed.

3.02 FABRICATION

- A. Shop Fabrication and Assembly:
 - 1. Fabricate and assemble structural assemblies in the shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on contract documents. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
- B. Cleaning and Straightening:
 - Wire brush steel materials and clean off loose mill scale and rust. Straighten steel members by non-injurous methods prior to fabrication. Remove twists or bends after punching or working component parts of a member before the parts are assembled. Produce finished members free from twists, bends, and open joints when erected.
- C. Provide and deliver test samples for material properties verifications per Paragraph 1.6.0.3 and 1.6.0.4 to the testing laboratory.

- D. The extent of the welding to webs of rolled sections shall be carefully controlled. The web welds shall not extend into the "K" dimension (web-flange intersection). Stress relief access holes shall be provided in the webs. If the access holes are made with a cutting torch or by means of air-arc cutting, the surfaces of the holdes shall be cleaned and made smooth by grinding. Grinding shall be sufficient to remove surface transformation effects and any discontinuities or notches. A minimum thickness of material of 1/32" shall be removed by grinding. Regardless of the method employed to fabricate the stress relief access holes, the surface of the hole shall be smooth per AWS C4.1-77 Class 4; lack of smoothness shall be cause for rejection.
- E. Connections:
 - 1. Weld or bolt shop connections, as indicated.
- F. Welded Construction:
 - 1. Strictly comply with AWS D1.1 code for procedures, appearance, and quality of welds, and methods used in correcting defective welding work.
- G. Assemble and weld built-up sections by some method which will produce true alignment of axes without warp.
- H. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work, including hole reinforcing as shown or required.
- I. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning.
- J. Holes in steel may be punched 1/16" larger than nominal diameter of bolt if steel thickness is equal to or less than 1/8" plus bolt diameter. If the steel is thicker than the diameter of the bolt plus 1/8", the holes shall be drilled or sub-punched and reamed. Diameter of sub-punched holes, and the drill for sub-drilled holes, shall be 1/16" smaller than the nominal diameter of the bolt to be installed. Precisely locate finished holes to ensure passage of all bolts through steel assemblies without drifting. Enlarge holes only by reaming. Poor matching of holes is cause for rejection.
- K. Gas Cutting:
 - Use of a cutting torch is allowed where the metal being cut is not stressed during the operation, and provided stresses are not transmitted through flame-cut surface. Make gas cuts with a smooth regular contour. Deduct 1/8" from the width of gas cut edges to determine the effective width of gas cut members. Make re-entrant gas cut radius as large as possible, but 1" minimum. For re-entrant corners (e.g. slots in tube steel braces) drill 1" (inch) diameter pilot holes.
- L. Welded Construction:
 - 1. Strictly comply with AWS Codes for procedures, appearance, and quality of

welds, and methods used in correcting welding work. Assemble and weld built-up sections by methods that will produce true alignment of axes without warp.

- a. Conform to AWS D1.1 and D1.3, as modified by referenced AISC Standards, and as indicated or noted on Drawings. Employ welding operators qualified in accordance to AWS D1.1 and D1.3, as applicable, who are thoroughly trained and experienced in arc welding and that produce uniformly reliable groove and fillet welds in flat, vertical, and overhead positions, and make neat and consistent welds. Weld all structural steel joints by shielded electric-arc method, unless otherwise shown, specified, or approved.
- b. Qualifications of Welders:
 - Each welder working on the Project shall be assigned an identification symbol or mark. Each welder shall mark or stamp his identification symbol at each completed weldment.
- c. Welding and welding operators shall be qualified per AWS "Standard for Qualifications." The contractor shall require any welder to retake the test when, in the opinion of the Architect, the work of the welder creates a reasonable doubt as to the proficiency of the welder. All such tests shall be made using the filler metal to be used in actual fabrication.
- d. Tests, when required, and costs for qualifying welders shall be conducted at no additional expense to the Owner.
- e. Recertification of the welder shall be made to Architect only after the welder has taken and passed the required retest. The Architect may require coupon to be cut from any location in any joint for testing. All sections of welds found defective shall be chipped or cut out to base metal and properly re-welded before proceeding with the Work.
 - Should any 2 coupons cut from the work of any welder show strengths that, under test, are less than that of the base metal, it will be considered evidence of negligence of incompetence and such welder shall be permanently removed from the Work.
 - 2) When coupons are removed from any part of a structure, the member's cut shall be repaired, at no additional cost to the Owner. Make repairs in a neat and workmanlike manner with joints of proper type to develop the full strength of the member and joint cut. Peen as necessary or directed to relieve residual stress.
- f. Provide stress relieving of welded assemblies per this Section for the joints at location indicated on plans.
- g. Storage and Care of Electrodes:
 - Coating of low hydrogen type electrodes shall be thoroughly dry as used. Conform to AWS D1.1. Use electrodes taken from hermetically sealed packages within time limit specified therein after package is opened. Electrodes not used within allowable time period and electrodes that have been exposed more than one hour to air having a relative humidity of 75% or greater shall be dried according to AWS D1.1 before they are used, or shall be

reconditioned according to electrode manufacturer's recommendations. Electrodes so dried or reconditioned and not used within allowable time period shall be redried before use. Electrodes of any class that have been wet shall not be used under any conditions.

- h. Preparation:
 - Clean surfaces to be welded of all paint, grease, oil, mill scale, and foreign matter. Clean weld each time the electrode is changed. Chip full surface of hand guided and controlled flame-cut edges before welding. Steel surfaces prepared with automatic or mechanically guided and controlled equipment need not be ground or chipped before welding.
- i. Procedures:
 - 1) During assembling and welding, hold components of a built-up member with adequate clamps, bolts, or other means to keep parts straight and in tight contact.
 - (a) GMAW, FCAW-G, GTAW, and EGW shall not be performed when the wind velocity in the immediate vicinity of the weld exceeds three miles per hour. Welding performed within an enclosed area, and not subject to drafts may be deemed to satisfy this requirement. SMAW, FCAW-S, and SAW may be performed without limitation to wind velocity, provided the wind does not affect the appearance of the molten weld puddle. Cut out defective welding with chisel or air arc and replace.
- j. Maintain record of welding procedures, welders employed, date of qualification and identification symbol of mark. Submit at completion of Work, or upon request, certified copies of records.
- k. Related Welding:
 - 1) Conform to AWS D1.1 for fillet, plug, slot, partial, or flared groove, and lap. Welding starts and stops do not count as part of the effective length of any weld.
- I. Connection to Embedments in Concrete and Masonry:
 - 1) Make welds to metal embedments installed in concrete or masonry construction with electrodes of size and by methods that will ensure against damage to adjacent construction due to heat input to and connection from embedded metal.
- m. Weather Exposed Welds:
 - 1) Seal weld around entire connection where welds remain exposed to weather, in addition to required structural welding.
- n. Weld Characteristics:
 - Clean and wire brush all welds. Visual inspection of finished welds must show uniform section, smoothness of welded metal, feather edges without undercuts or overlays, freedom from porosity and inclusions, and good fusion and penetration to base metal at edges and ends of fillet welds.
- o. Weld Finishing:

- 1) Grind exposed welds to smooth surfaces free of holes, slag, or other defects, flush with adjoining surfaces. No finish treatment is required for permanently concealed welds.
- M. Shop Coatings:
 - 1. Steel work shall be thoroughly cleaned by "Power Tool Cleaning' or "Blast Cleaning."
 - a. Remove loose mill scale, loose rust, weld slag or flux deposit, dirt.
 - b. Conform to the Steel Structures Painting Council Surface Preparation Specifications.
 - 1) Power tool cleaning: SSPC SP3
 - 2) Commercial blast cleaning: SSPC SP6
 - 2. Oil, grease, or salts shall be removed by "Solvent Cleaning."
 - a. Conform to the Steel Structures Painting Council Surface Preparation Specifications.
 - 1) Solvent cleaning: SSPC SP1
 - 3. Shop prime steel work, except where steel is to be encased in concrete, where edges are to be field welded, or steel is to be galvanized.
 - a. Apply one even coat of shop primer per the manufacturer's recommendations.
 - 1) Conform to Fed. Spec. TT-P-86, Type II.
 - 4. Galvanizing shall be performed by the hot-dip process after fabrication.
 - a. Galvanize largest practical sections.
 - b. Conform to ASTM A-123, 1.7 oz/sq. ft.
 - 5. Galvanizing of small items such as bolts, nuts, washers, etc. shall be performed after fabrication in accordance with ASTM A-153.
 - a. Straightening of materials after galvanizing shall be performed without damage to the coating.
 - 6. After erection, tough up paint parts where paint has been damaged.
- N. Erection:
 - 1. Erected plumb, square, true-to-line, and level.
 - 2. Provide temporary bracing wherever necessary to handle loads to which the structure may be subjected.
 - a. Leave bracing in place as long as may be required for safety.
 - 3. Provide temporary connections as needed to handle dead load, wind, and erection stresses.
 - 4. Align structure prior to permanent bolting or welding.

3.03 TOLERANCES

- A. Erect members to the tolerances conforming to referenced AISC Standards, except as follows:
 - 1. Vertical Dimensions:
 - a. Measured from top of beams at their connection at any column, variation not more than 1/4" plus or minus per story or when variations are accumulative from floor to floor, not exceeding 3/8" per story exclusive of column shortening due to dead load.

- 2. Plumb Displacement:
 - a. Center line of columns from established column line, no more than 1" toward or away from established center line.
- 3. Floor Elevation:
 - a. Top of steel elevation for floor elevation will be considered level if on any one floor, all beams connecting to column at the column connections do not vary more than 3/8" plus or minus.
- 4. Horizontal Dimesion Variances:
 - a. Governed by specific column plumb displacement.

3.04 ERECTION

- A. General:
 - 1. Comply with AISC Specifications and Code of Standard Practice, and as herein specified.
- B. Temporary Shoring and Bracing:
 - 1. Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.
- C. Temporary Planking:
 - 1. Provide temporary planking and working platforms as necessary to effectively complete the work.
- D. Setting Bases and Bearing Plates:
 - Furnish and deliver anchor bolts with setting drawings and templates. Verify position of bolts prior to delivery of steel; report errors or deviation for correction to the Architect.
 - a. Clean concrete bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean the bottom surface of base and bearing plates.
 - b. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
 - c. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but, if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
- E. Field Assembly:
 - 1. Set structural frames accurately to lines and elevations. Align and adjust various members forming a part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - a. Level and plumb individual members of structure within specified tolerances.
 - b. Splice members only where indicated and accepted on final shop

drawings.

- c. Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
- d. All back-up bars, dams, and runoff tabs shall be removed: the weld, base metal shall be ground flush and smooth per AWS.
- F. Gas Cutting:
 - 1. Do not use gas cutting torches in field for correcting fabrication errors in structural framing. Cutting will be permitted only on secondary members which are not under stress. Finish gas-cuts sections equal to a sheared appearance when permitted.
- G. Damaged Members:
 - 1. Remove members damaged to an extent impairing appearance, strength or serviceability, as determined by Architect and replace with new members at no extra cost to the Owner.
- H. Field Touch-Up Painting:
 - 1. After structural steel erection and connections are completed, inspected, and approved, clean all connections to be painted and damage to shop painted surfaces, and apply a field touch-up coat of same primer used for shop coat.

3.05 QUALITY CONTROL - SHOP AND FIELD

- A. The Owner will engage an independent testing and inspection agency to inspect high strength bolted connections and welded connections and to perform tests and prepare test reports in accordance with applicable governing codes.
- B. Testing agency shall conduct and interpret test and state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.
- C. Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished safely.
- D. The testing agency may inspect structural steel at plant before shipment; however, Architect reserves the right at any time before final acceptance to reject material not complying with specified requirements.
- E. Correct deficiencies in structural work which inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as may be necessary to reconfirm any non-compliance of original work, and as may be necessary to show compliance of corrected work.
- F. Welding:
 - 1. Inspect and test during fabrication and erection of structural steel assemblies, as follows:

- a. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in the work. Record work required and performed to correct deficiencies.
- Inspect all welds. All welds shall be accepted visually prior to performing any non-destructive testing. Groove weld shall be inspected by ultrasonic or other approved non-destructive test methods. All testing shall be performed to AWS D1.1 Table 6.3 cyclically loaded nontubular connections.
- c. Ultrasonic testing shall be performed by a specially trained and qualified technician who shall operate the equipment, examine welds, and maintain a record of welds examined, defects found, and disposition of each defect. All defective welds shall be repaired and costs for retesting defective welds shall be paid by Contractor.
- d. Rate of Testing:
 - 1) All completed welds contained in joints and splices shall be tested 100 percent either by ultrasonic testing or by radiography.
- e. All welds when used in column splices shall be tested either by ultrasonic testing or radiography.
- f. Any material discontinuities shall be accepted or rejected on the basis of the defect rating in accordance with the criteria of AWS D1.1 Table 6.3 by the Architect.
- g. Welds inspected by visual or ultrasonic testing or any other approved method that does meet the requirements of AWS D1.1 shall be repaired or replaced as prescribed by AWS D1.1 repairs to confirmed repair work. Additional testing of repaired or replaced areas shall be made at the Contractor's expense.
- h. Should defects appear in base metal and/or in welds tested, repairs of defects in base metal or welds shall be similarly inspected, as approved by Architect at the contractor's expense until satisfactory performance is assured.
- ij. Other method of non-destructive testing and inspection, for example, liquid dye penetrant testing, magnetic particle inspection or radiographic inspection, may be used on weld if required.
- j. Lamellar Tearing:
 - 1) Lamellar tearing resulting from welding is a crack (with a zero tolerance) and shall be repaired per AWS D1.1.
- k. Lamination:
 - 1) Lamination is defects in the base metal. The rejection criteria shall be based on ASTM A435.
- I. Where lamination or conditions of lamellar tearing in base metal are revealed by testing, the steel fabricator shall submit a proposed method of repair for approval. Retesting of repaired areas is required. Costs of repair and retesting shall be borne by the Contractor.
- m. Magnetic Particle Testing:
 - 1) Magnetic particle testing when required shall be provided in accordance with AWS D1.1 for procedure and technique. The

standards of acceptance shall be in accordance with AWS D1.1 - Qualification.

- n. Inspection of Stress Relieving Process.
- G. Prior Testing of Base Material:
 - 1. Test material prior to fabrication in order to detect possible defects that would require difficult and expensive repair.
- H. Lines and levels of erected steel to be certified by a licensed surveyor.
- I. As Erected Drawings:
 - 1. After all steel has been erected, correct or revise shop drawings and erection diagrams to correspond with the changes made in the field.

3.06 CLEANING AND REPAIR

A. Rubbish and debris resulting from the operations of this trade shall be cleaned up and removed from the site as the work progresses.

3.07 CONDITION OF FINISHED WORK

- A. Plumb, level, square, and true-to-line.
- B. In location and orientation shown on drawings.
- C. Free of damage, defects, or blemishes.

END OF SECTION 05 12 00

METAL FABRICATIONS SECTION 05 50 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Steel framing and support for mechanical and electrical equipment.
 - 3. Steel framing and support for applications where framing and supports are not specified in other Sections.
 - 4. Steel weld plates and angles for casting into concrete not specified in other Sections.
 - 5. Submittal preparation.
 - 6. Clean up.

B. Related Sections:

- 1. Section 03 31 00 Structural Concrete Work.
 - a. Installing anchor bolts, steel pipe sleeves, wedge-type inserts and other items indicated to be cast into concrete.
- 2. Section 04 22 00 Reinforced Concrete Unit Masonry.
- 3. Section 05 12 00 Structural Steel Framing.
- 4. Section 05 55 00 Metal Stair Treads and Nosings
- 5. Section 05 52 13 Pipe and Tube Railings
- 6. Section 09 21 16 Gypsum Board Assemblies a. Metal backing anchoring railings.
- 7. Section 09 91 13 Exterior Painting
- 8. Section 09 91 23 Interior Painting

1.02 REFERENCES

- A. ASTM International (ASTM)
 - 1. ASTM A36/A36M Standard Specification for Carbon Structural Steel.
 - 2. ASTM A48/A48M Standard Specification for Gray Iron Castings.
 - 3. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 4. ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 5. ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 6. ASTM A500/A500M Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 7. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 8. ASTM A780 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

- 9. ASTM A1011/A1011M Standard 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.
- 10. ASTM B633 Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
- 11. ASTM C1107/C1107M Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
- 12. ASTM D1187 Standard Guide for Establishing Surveillance Test Program for Boron-based Neutron Absorbing Material Systems for Use in Nuclear Fuel Storage Racks in Pool Environment.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product Data: For the following:
 - 1. Metal bar gratings.
 - 2. Paint products.
 - 3. Grout.
 - 4. Metals.
- C. Shop Drawings: Show fabrication and installation details for metal fabrications.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
 - 2. Provide templates for anchors and bolts specified for installation under other Sections.
- D. Welding certificates.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code-Steel."
 - 2. AWS D1.3, "Structural Welding Code-Sheet Steel."
 - 3. AWS D1.6, "Structural Welding Code-Stainless Steel."

1.05 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls, structural components, and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
 - 2. Provide allowance for trimming and fitting at site.

1.06 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

2.02 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.03 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- B. Steel Tubing: ASTM A500, cold-formed steel tubing.
- C. Steel Pipe: ASTM A53/A53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
 1. Provide galvanized finish for exterior installations where indicated.
- D. Slotted Channel Framing: Cold-formed metal channels with continuous slot complying with MFMA-3.
 - 1. Size of Channels: As indicated on drawings.
- E. Cast Iron: ASTM A48/A48M, Class 30, unless another class is indicated or required by structural loads.
- F. Iron Castings: Either gray or malleable iron, unless otherwise indicated.

- G. Galvanized Steel Sheet: ASTM A653/A653M, G90 coating, structural steel, Grade 33, unless another grade is required by design loads.
- H. Wire Rod for Grating Main Runner and Crossbars: ASTM A1011 Carbon Steel.

2.04 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.

2.05 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Shop Primers: Provide primers that comply with Sections 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting".
- C. Galvanizing Repair Paint: High-zinc-dust-content paint for re-galvanizing welds in steel, complying with SSPC-Paint 20.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187.
- E. Non-shrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications. Do not use in wet areas or on exterior.
- F. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.06 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.

- E. Weld corners and seams continuously to comply 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. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, us Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where leaser conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated in drawings.

2.07 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts if units are installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports where indicated.

2.08 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with not less than two integrally welded steel strap anchors for embedding in concrete.

2.09 METAL BAR GRATINGS

- A. Design Loads for Grating and Connections:
 - 1. Horizontal Applications: All metal bar grating used in horizontal applications shall be designed for a vertical applied live and dead load of 73 lbs. per square foot and maximum deflection of 0.298". Combined point live and dead load of 145 lbs. in accordance with the latest edition of the California Building Code.
 - 2. Vertical application of grating for fence screens shall be designed for horizontal lateral loads in compliance with the latest edition of the California Building Code.
- B. Refer to Drawings for supporting members and sizes.
- C. Grating Materials:
 - 1. Materials for bearing bars and cross bars shall be:
 - a. 1011 carbon steel.
 - b. Allowable fiber stress: 18,000 psi.
 - c. Modulus of elasticity: 29,000,000 psi.
- D. All fasteners for grating systems shall be stainless steel.
- E. Finish metal bar grating panels after fabrications and after panel assembly with:
 - 1. Powder coat primer and powder coat finish per manufacturer's instructions.
 - 2. Colors: As selected by Architect from manufacturer's standard current color schemes

2.10 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.11 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - 1. ASTM A123/A123M, for galvanizing steel and iron products.
 - 2. ASTM A153/A153M, for galvanizing steel and iron hardware.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications.
- C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercutting or overlapping.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smoothly and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.02 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirement indicated on Shop Drawings.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

3.03 INSTALLING METAL BAR GRATINGS

A. General: Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.

3.04 ADJUSTING AND CLEANING

- A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in painting Sections 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting".
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 50 00

PIPE AND TUBE RAILINGS SECTION 05 52 13

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Pipe handrails and guardrails.
 - 3. Hot dip galvanizing, exterior railings.
 - 4. Shop priming, interior railings.
 - 5. Cast handrail wall brackets.
 - 6. Submittal preparation.
 - 7. Clean up.

B. Related Sections:

- 1. Section 03 21 00 Reinforcing Steel
- 2. Section 03 31 00 Structural Concrete Work
- 3. Section 06 10 00 Rough Carpentry
- 4. Section 09 91 13 Exterior Painting
- 5. Section 09 91 23 Interior Painting
- 6. Section 32 13 13 Site Concrete

1.02 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Shop Drawings or Layout Drawings:
 - 1. Submit shop drawings indicating materials, layout, and attachment of railings to Architect for review and approval prior to starting work.

1.03 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Workmen shall be skilled in this type of steel fabrication and erection.
 - 2. Welders shall be qualified by tests prescribed in the "Standards Qualification Procedure" of the AWS.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Pipe rails shall be Schedule 40 standard steel pipe.
 - 1. Size per drawings.
 - 2. Hot Dip Galvanize after fabrication per ASTM A123, Grade 75.
 - a. Interior pipe rails shall not be galvanized.

- 3. Shop priming shall meet Fed Spec TT-P-86, Type II; Sherwin Williams Procryl Metal Primer or equal.
 - a. Exterior pipe shall not be primed.
- 4. Galvanized finish repair:
 - a. Repair compound: ASTM D520, Type III high purity grad zinc dust. 24 lbs. lbs./gallon minimum weight per gallon.
 - 1) 52% by volume minimum solids content.
 - 2) 94% by weight in dry film minimum metallic zinc content.
 - 3) Galvilite Galvanizing Repair, ZRC Worldwide (800) 831-3275.
- B. Cast Handrail Wall Brackets:
 - 1. Malleable Iron:
 - a. Quality Standard: Style P-3 by R&B Wagner, Inc.
 - 2. Hot Dip Galvanize after fabrication per ASTM A-123, Grade 75.
 - 3. Shop priming shall meet Fed Spec TT-P-86, Type II; Sherwin-Williams Procryl Metal Primer or equal.
 - 4. When installed on wall to receive exterior cement plaster finish, install plaster filler.
 - a. Quality Standard: Style PF-3 by R&B Wagner, Inc.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify all required backing and blocking prior to enclosing framing.
- B. Verify framing or surfaces are acceptable prior to installing finish materials.
- C. Verify all dimensions, including grade elevations.
- D. Verify detail of existing field conditions.
 - 1. Coordinate adjustments for existing conditions with Architect prior to performing work.

3.02 FABRICATION

- A. Layout:
 - 1. Fabrication shall be of welded construction in the largest assemblies feasible to fit into the hot dip tanks. Minimize number of field welds after the hot dip process.
 - a. Re-entrant corners shall be shaped to a notch-free radius of at least onehalf inch (1/2").
- B. Railings and Handrails:
 - 1. Handrails for stairs and ramps shall be 1-1/4" to 1-1/2" diameter (1-1/2" nominal) and mounted 1-1/2" clear from side walls. CBC Section 11B-505.7 (cross section) and 11B-505.5 (clearance).

- 2. All welded joints and surfaces shall be ground smooth, no sharp or abrasive corners, edges, or surfaces. Wall surfaces adjacent to handrail shall be smooth. CBC Section 11B-505.8 (surfaces).
- C. Welding:
 - 1. Welding shall be done by the electric shielded arc process.
 - 2. Conform to the requirements of the latest edition of the AISC "Specification for the Design, Fabrication and Erection of Structural Steel Buildings".
 - 3. Conform to Section 3 and 4 of the AWS "Structural Welding Code D1.1".
 - 4. Electrodes shall be E-70 AWS.
- D. Cutting:
 - 1. Gas cutting shall be done by machine wherever possible.
- E. Bolted Connections:
 - 1. Bolt holes shall be one-sixteenth inch (1/16") larger than the nominal diameter of the bolt.
 - a. Holes may be punched if the thickness of the material is less than the nominal diameter plus one-eighth inch (1/8").
 - b. Holes shall be drilled or sub-punched and reamed if the thickness of the material is greater than the nominal diameter plus one-eighth inch (1/8").
- F. Painting:
 - 1. Shop Coating for Interior Hand and Guard Rails:
 - a. Cleaning shall conform to the Steel Structures Painting Council Surface Preparation Specifications as follows:
 - 1) Solvent cleaning: SSPC SP1.
 - 2) Power tool cleaning: SSPC SP3.
 - 3) Commercial blast cleaning: SSPC SP6.
 - b. Apply one coat of shop primer per the manufacturer's recommendations.
 - 2. Galvanizing for Exterior Hand and Guard Rails:
 - a. Galvanizing shall be performed by the hot-dip process after fabrication.
 - b. Galvanize in the largest practical sections.
 - c. Galvanizing shall conform to ASTM A123.
 - 1) Where specified for small structural steel or cast steel articles galvanizing shall be performed after fabrication in accordance with ASTM A153.
 - Repair all damaged galvanized material with approved/specified repair material. Manufacturer's requirements for prep and application shall be strictly followed.

3.03 INSTALLATION OR APPLICATION

A. Connections:

- 1. Bolts shall be zinc-plated machine bolts, unless otherwise noted.
- 2. Field welding shall meet all fabrication requirements listed above.
 - a. Grind off zinc plating at point of connections prior to welding where required.
 - b. After welding, all joints shall be ground smooth, degreased, and touch up galvanized with a 100% zinc compound.
- 3. Cast Handrail Brackets:
 - a. Attached to structure with lag bolts as detailed on Drawings.
 - 1) Use lag-screw expansions shields when attaching brackets to concrete.

3.04 QUALITY CONTROL

- A. Tolerances:
 - 1. Tolerances shall be as set forth in the latest edition of the AISC "Specification for the Design, Fabrication and Erection of Structural Steel Buildings".
 - 2. Handrails shall be set true-to-line and parallel to the slope of the walk or tops of nosing within 1/4" of dimensions indicated on the plans.

3.05 CLEANING OR REPAIR

- A. Clean and straighten material before fabrication.
 - 1. Remove scale and rust.
- B. Correct deformations resulting from fabrication processes.1. Heat shrinkage of low alloy structural steels will be permitted.

3.06 CONDITION OF FINISHED WORK

- A. Handrails shall have returns to within 1/2" of the adjacent wall or closed returns to supporting pipes.
- B. Handrails shall have welded end closures.
- C. Edges shall be ground smooth and free of sharp edges.
- D. Pipe splicing and butt joints shall be welded using beveled end welds.1. Grind smooth top to totally conceal weld.
- E. No sandpaper marks, hammer marks or blemishes will be allowed.

END OF SECTION 05 52 13

DECORATIVE METAL PANELS SECTION 05 70 00

PART 1 GENERAL

1.01 SUMMARY

A. Section includes patterned perforated metal panels utilized in <insert description of application>.

1.02 RELATED REQUIREMENTS

- A. Division 05 Sections for steel support structure.
- B. Division 09 Sections for field painting.

1.03 REFERENCES

- A. References, General: Versions of the following standards current as of the date of issue of the project or required by applicable code apply to the Work of this Section.
- B. Aluminum Association (AA):
 - 1. Aluminum Standards and Data.
- C. American Architectural Manufactures Association (AAMA):
 - 1. AAMA 2604 High Performance Organic Coatings on Aluminum Extrusions and Panels.
- D. Consumer Product Safety Commission (CPSC):
 - 1. Public Playground Safety Handbook.
- E. International Association of Plumbing & Mechanical Officials (IAPMO):
 - 1. IAPMO-UES Uniform Evaluation Services Evaluation Report for Decorative Perforated Metal Panels.
- F. Worldwide Burr Technology Committee Standard (WTB).1. WBTC-STD14.1997 draft.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's technical literature for each product specified.
- B. Shop Drawings:
 - 1. For each type of panel and accessory, showing material, thickness, dimensions, cutouts and penetrations, finish, and other information necessary to describe work.

- 2. Size and spacing of fasteners, mounting clips, and other panel attachment devices.
- 3. Panel Layout Drawings: Show panel layout and method of support.
- C. Manufacturer Instructions:
 - 1. Delivery, storage, and handling.
 - 2. Installation.
 - 3. Cleaning and repair.
- D. Samples: One for each pattern, in specified material and thickness, not less than 8-by-8 inches in size and showing geometry type that represents the specified pattern. Include finish sample(s) as well to represent exact specified finish.

1.05 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years documented experience.
- B. Installer: Experienced Installer with a record of successful installations of similar type and size to that specified.
- C. Mock-Ups:
 - 1. Install at location acceptable to Architect.
 - 2. Size: As shown in Drawings.
 - 3. Accepted mock-ups may remain as part of Work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's instructions. Protect against damage.

1.07 WARRANTY

- A. Submit panel manufacturer's limited warranty against defects in material and workmanship:
 - 1. Standard Factory-Applied Coatings to Aluminum Panels: Five years.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Thermal Movement: Allow for 180 deg. F thermal variation.
- B. Structural Requirements: Engineer panel assemblies to withstand loads in accordance with ASCE/SEI 7 and the following:
 - 1. Wind Loads: As indicated on Drawings.

C. At locations indicated on Drawings, comply with CPSC requirements with regards to entanglement; impalement; entrapment; and sharp points, corners, and edges.

2.02 MANUFACTURERS

- A. Manufacturer: Parasoleil, <u>https://parasoleil.com/</u>, <u>hello@parasoleil.com</u>, 303-589-4524.
 - 1. Substitution Limitations: Substitution requests shall be submitted in accordance with Division 00 and 01 and shall include:
 - a. Documentation that manufacturer has five years' experience manufacturing laser cut panels of type and quality specified and is licensed to produce copyrighted designs.
 - b. Documentation of three projects with similar types and quality of exterior laser cut panels including photographs of work, project address, and name and contact information for project designer, contractor, and owner.

2.03 METAL PANELS, GENERAL

- A. Provide complete engineered systems including panels and panel-mounting hardware.
- B. Provide system engineering services as follows:
 - 1. Panel thickness calibration.
 - 2. IAPMO-UES Product Certification.
 - 3. Finite Element Analysis.

2.04 METAL PANELS

- A. Manufacturer's standard laser-cut aluminum architectural panels.
- B. Nominal Size: 4x8.
- C. Panel Thickness: 1/8 inch.
- D. Pattern: Mariposa.
- E. Finish: Factory-Applied Standard Powder Coat: Parasoleil Quality Standard
 - 1. Colors: Color to be selected from manufacturers Standard and Patina offerings.
- F. Mounting System: Direct Mount PDHS fasteners.
- G. Do not allow unsupported edges except as shown on approved Shop Drawings.
- H. Modify panels as required to meet project requirements.

2.05 MATERIALS:

- A. Aluminum: AA 5000 series, H32 temper.
- B. Galvanic Barriers: Types recommended by manufacturer for conditions of use.
- C. Shims: Non-staining type suitable for conditions of use.

2.06 FABRICATION

- A. Cutting and Cutouts: Cut metal with laser cutter capable of 1/16-inch tolerance. Remove burrs in accordance with WBTD recommended "Deburring & Edge Finishing Handbook" by LaRoux K. Gillespie, Level D, without magnification.
- B. Predrill holes for fasteners in factory to extent practical.
- C. Complete fabrication before applying finishes.

2.07 FINISHES

- A. Powder Coatings, Coating Finish Process: Dry system with a minimum 50 percent fluoropolymer resin, meeting performance requirements of AAMA 2604 and the following:
 - 1. Product: AAMA-approved TGIC or HAA polyester powder coating.
 - 2. Dry Film Thickness, ASTM D7091: Not less than thickness applied to tested specimens meeting specified performance requirements, and as recommended by manufacturer for application.
 - 3. Specular Gloss, ASTM D523 at 60 deg.: 35 percent, plus or minus 5 percent.
 - 4. Dry Film Salt Spray, ASTM B117: Minimum 3,000 hours.

2.08 ACCESSORIES

- A. Mounting Systems: Manufacturer's provided engineered clips and attachment devices. Provide powder coated, 3/16-inch-thick aluminum mounting hardware for wood or steel support structure.
- B. Fasteners: Fasteners: Manufacturer's provided self-drilling, self-tapping screws.
- C. Color: Color of exposed-to-view fasteners in surfaces with factory-applied finishes shall be compatible with panel finish.
- D. Size and Spacing: As shown on approved Shop Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that conditions are ready for installation of panels. Correct defects before proceeding.

3.02 INSTALLATION

- A. Install plumb, level, square, and securely and in accordance with manufacturer's instructions.
- B. Factory-Painted Surfaces: Do not cut or weld in the field.
- C. Protect against contact between dissimilar metals.

3.03 PROTECTION AND REPAIRS

- A. Protect installed panels from damage.
- B. Damaged panels that cannot be repaired to Architect's satisfaction shall be removed and replaced with new panels.

END OF SECTION 05 70 00

ORNAMENTAL METAL WORK SECTION 05 74 00

PART1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1;
 - 2. Shop fabrication of ornamental metal panels and gates;
 - 3. Primer paint finish;
 - 4. Associated accessories and hardware:
 - 5. Installation of ornamental metal panels, gates, hardware, and accessories;
 - 6. Submittal preparation;
 - 7. Clean up.
- B. Related Sections:
 - 1. Section 03 31 00: Structural Concrete Work

1.02 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Shop Drawings or Layout Drawings:
 - 1. Submit copies of shop drawings to the Architect for review prior to beginning fabrication.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Steel Posts, Frames, and Pickets:
 - 1. Steel shapes with a cross sectional area of sixteen (16) square inches or more shall be Hollow Structural Shape (HSS).
 - a. HSS shall have a minimum wall thickness of 3/16", unless noted otherwise.
 - 2. Steel shapes and pickets with a cross sectional area of less than sixteen (16) square inches may be Tube Steel (TS).
 - a. TS shall be a minimum gauge of 11, unless noted otherwise.
 - 1) Pickets smaller than 3/4" shall be solid steel.
- B. Hinges shall be 5" x 6" no hole, non-swaged, double-weight, steel surface type:
 - 1. Daro #522417;
 - 2. Stanley # 852
 - 3. Or equal.

- C. Gate Latch shall be 6-1/2" zinc-plated heavy duty padlockable spring bolt.
 - 1. Stanley # 819045;
 - 2. Or equal.
- D. Shop primer shall meet Fed Spec TT-P-86, Type II:
 - 1. Modified aluminum epoxy mastic, Carboline Carbomastic 15;
 - 2. Or equal.
- E. Electrodes shall be E-70 per AWS.
- F. Lag bolts or machine bolts shall be zinc-plated.
- G. Paint:
 - 1. Refer to Paragraph 3.06 "Finish".

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify all required backing and blocking prior to enclosing framing.
- B. Coordinate sequencing of work with other affected trades.
- C. Field verify dimensions prior to fabrication.
- D. Start of work shall be considered as acceptance of existing conditions.

3.02 PREPARATION

A. Supply items to be cast-in-place, or to be embedded into concrete or masonry, along with setting templates to the appropriate contractors in a timely manner.

3.03 INSTALLATION OR APPLICATION

- A. Install per the manufacturer's latest written recommendations.
- B. Install plumb, true, and level.
 - 1. Brace or share work as required to compensate for erection loads and/or to maintain alignment.
- C. Accurately fit connections and trim.
- D. Field weld in accordance with AWS D1.1.
- E. Touch up field welds, scratches, and damaged surfaces with primer, and paint to required mil thickness.

3.04 FABRICATION

- A. Construction shall be of welded construction.
 - 1. Tightly fit and continuous weld joints.
 - 2. Use electric shielded arc process.
 - a. Conform to AISC Specifications for the Design Fabrication and Erection of Structural Steel Buildings.
 - b. Welds shall be continuous.
 - 3. Grind exposed welds flush and smooth with adjacent finishes.
 - 4. Grind exposed edges to uniform radius.
- B. Holes shall be drilled or subpunched and reamed to the required size of 1/16" larger than the required bolt.
- C. Countersink and flush exposed fasteners.

3.05 TOLERANCES

- A. Vertical parallel members shall be not more than 1/16" out of plumb in 4'-0".
- B. Equally spaced members shall not vary more than 1/16" from required centerline spacing.
- C. Shimming, where required, shall be equally distributed between mounts.

3.06 FINISH

- A. Thoroughly clean surfaces of rust, grease, scale, or other foreign matter.
 - 1. Cleaning shall conform to the Steel Structures Painting Council Surface Preparation Specification as follows:
 - a. For power tool cleaned surfaces: SSPC-SP 3
 - b. For commercial blast cleaned surfaces: SSPC-SP 6
 - c. For solvent cleaned surfaces: SSPC-SP 1
 - d. For brush-off blast cleaned surfaces: SSPC-SP 7
- B. Primer coat surfaces, unless noted otherwise.
 - 1. Do not prime coat surfaces to be field welded.
 - 2. Do not prime coat surfaces to be in direct contact bond with concrete.
 - 3. Apply prime coat per the manufacturer's recommendations.
 - 4. Apply one coat of primer to a dry thickness of 2.0 mils. Touch up welds.
- C. Shop paint ornamental metal, except surfaces and edges to be field welded, unless otherwise specified.
- D. Field apply aliphatic acrylic urethane enamel electrostatically to a dry film thickness of 2.0 to 3.0 mils.

- E. Touch up field welds, scratches, and damaged surfaces with primer, and paint to required mil thickness.
- F. Fences, Gates, and Hardware:
 - Gates in path of travel must comply with exit door requirements. (CBC Section 11B-206.5. Specify hardware that does not require pinching, grasping, or twisting motion to operate and provide solid kick plates 10" minimum high. Clear space below gate shall be 3" maximum above paving on both sides of the gate. The maximum effort to operate the gates shall not exceed 5 lbs.

3.07 CONDITION OF FINISHED WORK

A. Completed assemblies shall be clean, with no visible imperfections, distortions, or defects.

END OF SECTION 05 74 00

ROUGH CARPENTRY SECTION 06 10 00

PART 1 GENERAL

1.01 SUMMARY

- A. Provisions set forth in Divisions 0 and 1;
 - 1. Structural framing.
 - 2. Floor, wall, and roof sheathing.
 - 3. Preservative treatment of wood.
 - 4. Fire retardant treatment of wood.
 - 5. Miscellaneous framing and sheathing.
 - 6. Telephone and electrical panel boards.
 - 7. Wood nailers and curbs for roofing and items installed on roof.
 - 8. Roofing cant strips.
 - 9. Concealed wood blocking for support of toilet and bath accessories, wall cabinets, wood trim, markerboards/tackboards, projector screens, etc.
 - 10. Miscellaneous wood nailers and furring strips.
- B. Related Sections
 - 1. Section 05 50 00: Metal Fabrications
 - a. Miscellaneous steel connectors and support angles for wood framing.
 - 2. Section 06 15 00: Wood Decking.
 - 3. Section 06 17 00: Shop-Fabricated Structural Wood.
 - 4. Section 07 62 00: Sheet Metal Flashing and Trim
 - a. Sill flashings.

1.02 REFERENCES

- A. American National Standards Institute (ANSI)
 - 1. ANSI A208.1 American National Standard for Particleboard.
- B. ASTM International (ASTM)
 - 1. ASTM A 153/A 153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - ASTM A 653/A 653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 3. ASTM D 2898 Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing.
 - 4. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. American Wood Protection Association (AWPA)
 - 1. AWPA C2 Lumber, Timber, Bridge Ties and Mine Ties -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association.

- 2. AWPA C9 Plywood -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association.
- 3. AWPA C20 Structural Lumber -- Fire Retardant Treatment by Pressure Processes; American Wood-Preservers' Association.
- 4. AWPA C27 Plywood -- Fire-Retardant Treatment by Pressure Processes; American Wood-Preservers' Association.
- 5. AWPA U1 Use Category System: User Specification for Treated Wood; American Wood-Preservers' Association.
- D. American Softwood Lumber Standard (ALSC)
 - 1. PS 20 American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce).
- E. West Coast Lumber Inspection Bureau (WCLB)1. WCLB (GR) Standard Grading Rules for West Coast Lumber No. 17.
- F. Western Wood Products Association (WWPA)1. WWPA G-5 Western Lumber Grading Rules.

1.03 SUBMITTALS

- A. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.
- B. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.04 QUALITY ASSURANCE

- A. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.
 - 1. Acceptable Lumber Inspection Agencies: Any agency with rules approved by American Lumber Standards Committee.
- B. Exposed-to-View Rough Carpentry: Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
- C. Fire-Retardant Treated Wood: Mark each piece of wood with the producer's stamp indicating compliance with specified requirements.
- D. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

1.05 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.01 DIMENSION LUMBER

- A. Sizes: Nominal sizes as indicated on drawings.
- B. Moisture Content: Provide seasoned lumber with 19% maximum moisture content.
- C. Structural Framing:
 - 1. Lumber: S4S, No. 1 or Better.
- D. Miscellaneous Blocking, Furring and Nailers:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.02 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere. Type as indicated on drawings.
 - 2. Furnish bolts and attachments to other trades for installation in masonry and concrete work.
 - 3. Nails: Common wire, galvanized for exterior use.
 - 4. Lag Screws and Wood Screws: Steel. Conforming to ANSI/ASME Standard B18.2.1, galvanized for exterior use.
 - 5. Machine Bolts: ASTM A307, galvanized for exterior use.
 - 6. Plain Washers: ANSI B18.22, galvanized for exterior use.
 - 7. Hangers, Straps, Ties and other Framing Connectors: Steel, Galvanized. "Simpson Strong-Tie" unless noted otherwise.
- B. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.
- C. Sill Flashing: As specified in Section 07 62 00 "Sheet Metal Flashing and Trim".
- D. Subfloor Glue: Waterproof, water base, air cure type, cartridge dispensed.
- E. Building Paper: No. 15 asphalt felt.

2.03 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

- B. Fire Retardant Treatment:
 - 1. Manufacturers/Products:
 - a. Arxada Arch Wood Protection, Inc: www.arxada.com.com.
 - 1) FRX (exterior applications).
 - 2) Dricon FS (Interior applications).
 - b. Hoover Treated Wood Products, Inc.: www.frtw.com.
 - 1) ExteriorFireX (exterior applications).
 - 2) PyroGuard (interior applications).
 - c. Osmose, Inc. (www.osmose.com).
 - 1) Osmose Fire-Guard (exterior and interior lumber).
 - d. Substitutions: See Section 01 60 00 "Product Requirements".
 - 2. Exterior Type: AWPA Use Category UCFB, Commodity Specification H (Treatment C20 for lumber and C27 for plywood), chemically treated and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E 84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D 2898.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Treat rough carpentry items as indicated.
 - c. Do not use treated wood in applications exposed to weather or where the wood may become wet.
 - 3. Interior Type A: AWPA Use Category UCFA, Commodity Specification H (Treatment C20 for lumber and C27 for plywood), low temperatures (low hygroscopic) type chemically treated, and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance for an additional 20 minutes.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Treat rough carpentry items as indicated.
 - c. Do not use treated wood in applications exposed to weather or where the wood may become wet.
- C. Preservative Treatment:
 - 1. Manufacturers:
 - a. Arxada Arch Wood Protection, Inc: www.arxada.com.com.
 - 1) Wolman E:
 - b. Viance, LLC.; www.treatedwood.com.
 - 1) Product TimberSaver PT.
 - c. Substitutions: See Section 01 60 00 "Product Requirements".
 - 2. Preservative Pressure Treatment of Lumber Above Grade: AWPA Use Category UC3B, Commodity Specification A (Treatment C2) using waterborne preservative to 0.25 lbs/cu ft retention.
 - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber in contact with roofing, flashing, or waterproofing.
 - c. Treat lumber in contact with masonry or concrete.

- d. Treat lumber less than 18 inches above grade.
- e. Preservative Pressure Treatment of Plywood Above Grade: AWPA Use Category UC2 and UC3B, Commodity Specification F (Treatment C9) using waterborne preservative to 0.25 lb/cu ft retention.
 - 1) Kiln dry plywood after treatment to maximum moisture content of 19 percent.
 - 2) Treat plywood in contact with roofing, flashing, or waterproofing.
 - 3) Treat plywood in contact with masonry or concrete.
 - 4) Treat plywood less than 18 inches above grade.
 - 5) Treat plywood in other locations as indicated.
- 3. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA Use Category UC4A, Commodity Specification A (Treatment C2) using waterborne preservative to 0.4 lbs/cu ft retention.
- 1. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
- 2. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 EXECUTION

3.01 FRAMING INSTALLATION

- A. Verify that surfaces to receive rough carpentry materials are prepared to require grades and dimensions.
- B. Conduct work under direction of capable experienced foreman.
- C. Accurately located members to line and dimension. Ensure full contact of timbers framed together. Ensure let-in members in full contact on two surfaces. Where there is a significant variation in moisture content between individual members, shrinkage shall be allowed for and final connection shall not be made until moisture content of adjacent members has been stabilized. Allow no construction over framing members until final connections and/or adjustments have been made to achieve maximum strength at connections and maximum future movement from shrinkage or expansion.
- D. Cutting: Do all cutting and framing required to accommodate structural members, piping conduit, ducts and installation of mechanical, electrical, and other equipment and apparatus.
 - 1. Obtain Architect's approval for cutting of structural members not detailed on structural drawings.
 - 2. Reinforce cut sill and top plates with metal straps in accordance with the requirements of the drawings.
- E. Bracing and Shoring: Provide all supports, guys and braces, required to stabilize structure during construction.

- F. Accurately saw-cut and fit lumber into position and securely nail, spike, lag bolt, or bolt as required.
- G. Fasteners: Installation of fasteners shall be performed in accordance with ANSI/ASME Standard B18.6.1. Drill holes for fasteners and size as noted:
 - 1. Nails and spikes: Smaller than diameter of fastener. Predrill as required to prevent splitting.
 - 2. Lag Bolts: Drill holes same length as shank. Bit size no larger than base of threaded portion of screw.
 - 3. Bolts: Holes 1/32" 1/16" larger than bolt.
 - 4. Framing Connectors: Smaller than diameter of fastener. Predrill as required to prevent splitting.
 - 5. No lubricant of any kind shall be used on any fastener depending on friction for holding.
- H. Nailing: Refer to details and tables on drawings for specific nailing requirements. In absence of specific instruction, comply with the following:
 - 1. Edge Distance: 1/4 length of fastener.
 - 2. Toe Nailing: Drive toe nails at an angle or approximately thirty degrees with the piece and started approximately one-third the length of the nail from end of piece.
 - 3. Replace split or otherwise damaged structural members.
- I. Bolts: Use standard cut washer under bolt heads and nuts against wood. Use heavy plate washer or malleable iron washer where noted on drawings. Drive into place. Ensure full engagement of nut, but projection of bolt beyond nut not to exceed one bolt diameter. Tighten nuts at installation and again immediately prior to enclosure.
- J. Lag Screws: Lubricate with soap or similar material. Turn into place without driving. Ensure penetration into lagged member of 60 percent of screw length. Lead hole shall have diameter of about 70 percent of the root diameter of the screw. Provide washers of same sizes as specified for bolts.
- K. Framing Connectors: Drive nails into all holes of each connector. Install all bolts in each framing connector unless detailed otherwise.
- L. Screws: Screws shall not be driven by hammering.
- M. Frame openings with two or more studs at each jamb and support headers on cripple studs unless noted otherwise in the drawings.
- N. Provide miscellaneous members as indicated or as required to support finishes, fixtures, specialty items, and trim.

3.02 INSTALLATION OF ACCESSORIES AND MISCELLANEOUS WOOD

- A. Place full width continuous sill flashings under framed walls on cementitious foundations. Lap flashing joints 4 inches and seal.
- B. Place sill gasket directly on sill flashing. Puncture gasket cleanly and fit tightly to protruding foundation anchor bolts.
- C. Coordinate installation of wood decking, wood chord metal joists, glue laminated structural units, prefabricated wood trusses, and plywood web joists.
- D. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.
- E. Coordinate curb installation with installation of decking and support of deck openings.

3.03 SILLS AND PLATES

- A. Install Pressure Preservative-treated lumber for plates and sill in contact with concrete or masonry construction.
- B. Bolt to foundations and slabs. Level sill with shims, washers placed, and nuts tightened to level bearing.
- C. Park space between sill and concrete with non-shrink grout.

3.04 STUD WALLS, PARTITIONS AND FURRING

- A. Provide studs in continuous lengths without splices.
- B. Plates: Provide single bottom plate and double top plate. Stagger joints 4' minimum in top plates.
- C. Nail or anchor plates to supporting construction.
- D. Corners and Intersections: Frame with 3 studs or as detailed in the drawings.
- E. Openings: Frame with double studs each side and double headers placed on edge, resting on cripple studs.
- F. Provide continuous horizontal blocking row at mid-height of single-story partitions over 8' high and at midpoint of multi-story partitions, using 2" thick members of same width as wall or partitions.
- G. Cut-in blocks wherever necessary for bracing or backing for applied finish or fixtures. Cut-in 2" solid blocking between studs at all horizontal joints in non-structural plywood wall sheathing.

3.05 FLOOR FRAMING

- A. Girders, Posts, Ledgers, and Anchors: Set accurately and secure with level bearings. Coordinate work with Cast-in-Place Concrete Contractor to set bolts and anchors properly
- B. Floor Joists: Lay with crowning edge up, with 1-1/2" minimum bearing at supports except, at ledgers, full width of ledger.
- C. Blocking: Provide 2" solid blocking of same depth as joist at all walls and partitions.
- D. Bridging: Provide bridging for floor joists of more than 4" depth which are spaced 32" on center or less. Bridge floor joists every 8' by solid blocking 2" thick and full depth of joist or by wood cross bridging of not less than 1"x3" or nailed metal cross bridging of equal strength. Where cross bridging is used, drive lower ends of such cross bridging up and nail after floor or subfloor has been nailed.
- E. Piping: Where partitions containing plumbing, heating, or other piping occur above joists, space joists to give clearance for piping. Where partition containing piping runs parallel to floor joists, double joists below partition spaced to permit passage of pipes, and solid bridged.
- F. Joist: Double header joists and hang on steel joist hangers. Hang joists on steel joist hangers, Double trimmer joists receiving header joists over 6' long.

3.06 JOISTS AND RAFTERS

- A. Joists and Rafters: Lay with crowning edge up with full end bearing.
- B. Openings: Frame for hatches, vents, and other openings as required.
- C. Bridging: Provide bridging for roof joists or rafters of more than 8" which are spaced 32" on center or less. Bridge roof joist or rafters every 10' by solid blocking 2" thick and full depth of joist or rafter, or by wood cross bridging of not less than 1"x3" or nailed metal cross bridging of equal strength. Where cross bridging is used, drive lower ends of such cross bridging up and nail after roof sheathing has been nailed.
- D. Solid Blocking: Install between roof rafters and ceiling joists over partitions and at end supports as indicated.
- E. Plywood Roof Sheathing: Install plywood over rafters or decking as indicated on drawings. Thickness and nailing shall be as indicated on structural drawings.
- F. Plywood Joints: Install 1/2" H clips at butt joints of roof sheathing, between rafters spaced 24" on center where solid blocking is not required.

3.07 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment compatible with factory applied treatment at sitesawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

3.08 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.
- C. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

END OF SECTION 06 10 00

WOOD DECKING SECTION 06 15 00

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

- 1. Provision set forth in Divisions 0 and 1.
- 2. Plywood decking.
- 3. Oriented strand board wood decking (OSB).
- 4. Fire retardant treatment of wood.
- 5. Preservative treatment of wood.

B. Related Sections

- 1. Section 06 10 00: Rough Carpentry.
- 2. Section 09 91 13: Exterior Painting.
- 3. Section 09 91 23: Interior Painting.

1.02 REFERENCES

- A. American Institute of Timber Construction
 - 1. AITC 109 Standard for Preservative Treatment of Structural Glued Laminated Timber; American Institute of Timber Construction.
 - 2. AITC 111 Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage and Erection; American Institute of Timber Construction.
- B. ASTM International (ASTM)
 - 1. ASTM D 2898 Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing.
 - 2. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. American Wood Protection Association (AWPA)
 - 1. AWPA C2 Lumber, Timber, Bridge Ties and Mine Ties -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association.
 - 2. AWPA C9 Plywood -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association.
 - 3. AWPA C20 Structural Lumber -- Fire-Retardant Treatment by Pressure Processes; American Wood Preservers' Association.
 - 4. AWPA C27 Plywood -- Fire-Retardant Treatment by Pressure Processes; American Wood-Preservers' Association.
 - 5. AWPA U1 Use Category System: User Specification for Treated Wood; American Wood-Preservers' Association.

- D. American Softwood Lumber Standard (ALSC)
 - 1. PS 20 American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce).
- E. West Coast Lumber Inspection Bureau (WCLB)1. WCLB (GR) Standard Grading Rules for West Coast Lumber No. 17.
- F. Western Wood Products Association (WWPA)1. WWPA G-5 Western Lumber Grading Rules.
- G. Underwriters Laboratories Inc (UL)1. UL (FRD) Fire Resistance Directory.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials.

1.04 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. Lumber: PS 20 and approved grading rules and inspection agencies.
 - 2. Lumber Inspection Agency: Any agency with rules approved by American Lumber Standards Committee.
 - 3. Structural Panels: As indicated in structural drawings.
- B. Perform work in accordance with AITC A190.1.
 - 1. Maintain one copy of document on site.
- C. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience and certified by AITC.
- D. Installer: Company specializing in performing work of the type specified in this section with minimum 2 years of experience.
- E. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
- F. Pressure Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire retardant requirements.

1.06 DELIVERY, STORAGE, AND PROTECTION

- A. Protect glue laminated members in accordance with AITC 111 requirements.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Plywood Decking:
 - 1. Georgia-Pacific Corporation.
 - 2. Louisiana-Pacific Corp; Product.
 - 3. Weyerhaeuser Co; Product.
- B. Oriented Strand Board Decking:
 - 1. Georgia-Pacific Corporation.
 - 2. Louisiana-Pacific Corp; Product.
 - 3. Weyerhaeuser Co; Product.

2.02 WOOD MATERIALS

- A. Plywood Decking: As indicated in structural drawings.
- B. Oriented Strand Board Decking: Substitution of plywood decking with OSB decking is not allowed. Do not use OSB decking where drawings specify plywood decking. Provide OSB decking of type and thickness indicated in the drawings.

2.03 ACCESSORIES

- A. Adhesive: Waterproof, air cure type, cartridge dispensed.
 - 1. Liquid Nails Extreme Heavy Duty Construction Adhesive.
 - 2. Loctite PI Premium Advanced.
 - 3. Gorilla Heavy Duty Construction Adhesive

2.04 WOOD TREATMENT

- A. Factory-Treated Lumber and Plywood: Comply with requirements of AWPA U1 -Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
- B. Fire Retardant Treatment:
 - 1. Manufacturers/Products:
 - a. Arxada Arch Wood Protection, Inc: www.arxada.com.com.
 - 1) FRX (exterior applications).
 - 2) Dricon FS (Interior applications).
 - b. Hoover Treated Wood Products, Inc.: www.frtw.com.
 - 1) ExteriorFireX (exterior applications).
 - 2) PyroGuard (interior applications).
 - c. Osmose, Inc. (www.osmose.com).
 - 1) Osmose Fire-Guard (exterior and interior lumber).
 - d. Substitutions: See Section 01 60 00 "Product Requirements".
 - 2. Exterior Type: AWPA Use Category UCFB, Commodity Specification H (Treatment C20 for lumber and C27 for plywood), chemically treated and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E 84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D 2898.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Treat rough carpentry items as indicated.
 - c. Do not use treated wood in applications exposed to weather or where the wood may become wet.
 - 3. Interior Type A: AWPA Use Category UCFA, Commodity Specification H (Treatment C20 for lumber and C27 for plywood), low temperatures (low hygroscopic) type chemically treated, and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance for an additional 20 minutes.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Treat rough carpentry items as indicated.
 - c. Do not use treated wood in applications exposed to weather or where the wood may become wet.
- A. Preservative Treatment:
 - 1. Manufacturers:
 - a. Arxada Arch Wood Protection, Inc: www.arxada.com.com.
 - 1) Wolman E:
 - b. Viance, LLC.; www.treatedwood.com.
 - 1) Product TimberSaver PT.
 - c. Substitutions: See Section 01 60 00 "Product Requirements".

- 2. Preservative Pressure Treatment of Lumber Above Grade: AWPA Use Category UC3B, Commodity Specification A (Treatment C2) using waterborne preservative to 0.25 lbs/cu ft retention.
 - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber in contact with roofing, flashing, or waterproofing.
 - c. Treat lumber in contact with masonry or concrete.
 - d. Treat lumber less than 18 inches above grade.
 - e. Preservative Pressure Treatment of Plywood Above Grade: AWPA Use Category UC2 and UC3B, Commodity Specification F (Treatment C9) using waterborne preservative to 0.25 lb/cu ft retention.
 - 1) Kiln dry plywood after treatment to maximum moisture content of 19 percent.
 - 2) Treat plywood in contact with roofing, flashing, or waterproofing.
 - 3) Treat plywood in contact with masonry or concrete.
 - 4) Treat plywood less than 18 inches above grade.
 - 5) Treat plywood in other locations as indicated.
- 3. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA Use Category UC4A, Commodity Specification A (Treatment C2) using waterborne preservative to 0.4 lbs/cu ft retention.
 - Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
 - 2. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that support framing is ready to receive decking.

3.02 PREPARATION

A. Coordinate placement of bearing and support items.

3.03 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment in accordance with manufacturer's instructions.
- B. Brush apply one coat of preservative treatment on wood in contact with cementitious materials. Treat site-sawn cuts.
- C. Allow preservative to dry prior to erecting members.

3.04 INSTALLATION

- A. Install decking perpendicular to framing members, with ends staggered over firm bearing.
- B. Engage plywood tongue and groove edges as applicable.
- C. Allow expansion space at edges and ends.
- D. Attach decking with as indicated in structural drawings.
- E. Use sheathing clips at unsupported edges of plywood between supporting framing members.
- F. Cut decking to accommodate roof drain and flange.

END OF SECTION 06 15 00

ENGINEERED WOOD PRODUCT SECTION 06 17 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Engineered wood products.
 - a. Wood-I-Joist with wood flanges and web.
 - 3. Submittal preparation.
 - 4. Clean up.
- B. Related Sections:
 - 1. Section 06 20 00 Finish Carpentry

1.02 REFERENCES

- A. American Wood Protection Association (AWPA)1. AWAP U1-15, U2 Interior/Damp Use.
- B. ASTM International (ASTM)
 - 1. ASTM E518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus (R-Value).
- C. ICC Evaluation Services

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product Data: Submit manufacturer's current published data including materials and installation instructions.

1.04 QUALITY ASSURANCE

- A. General:
 - 1. Engineered wood products shall have current model code evaluation/research reports that are acceptable to authorities having jurisdiction and that evidence compliance for the application indicated with specified requirements and the building code in effect for this Project.
 - a. Identification Markings:
 - 1) Each member shall be stamped with an identifying mark showing the ICC-ESR Evaluation Number and the manufacturer logo.

PART 2 PRODUCTS

2.01 MANUFACTURERS/PRODUCTS

- A. Subject to compliance with requirements, materials that may be incorporated into the work include, but are not limited to, the following:
 - 1. Laminated Veneer Lumber:
 - a. Wood-I-Joist:
 - 1) TJI JOISTS; Truss Joist Corporation/Weyerhaeuser.
 - a) ICC ESR-1153
 - 2) Or approved equal.

PART 3 EXECUTION

- 3.01 INSPECTION
 - A. Continuous independent inspection of prefabricated wood lumber fabrication is not required. Ongoing quality control (QC) testing shall meet the requirements of ICC AC14, which includes the minimum requirements of ASTM D5055, Sections 8, 9, and 10. All quality control audits in compliance with Appendix B of ICC-ES AC14, resulting from unannounced audits by a third party auditor of a qualified third party inspection agency must be maintained by the manufacturers and made available to the Architect upon request.
 - B. Where applicable, all plywood, lumber, and/or OSB material used on the fabrication of prefabricated wood products shall be grade stamped by an acceptable grading agency.
 - C. The installer must examine the substrates and supporting structure and the condition under which the carpentry work is to be installed and notify the Contractor in writing of conditions detrimental to the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
 - D. Visually graded lumber that is cut or ripped to a smaller normal size shall be regraded by a qualified lumber grader prior to use.

3.02 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store members with care, and in accordance with manufacturer's instructions and recommendations to avoid damage from bending, overturning, or other cause for which member is not designed to resist or endure. Protect members from weather with factory applied protective covering until erected.
- B. Time delivery and erection of members to avoid delaying work of other trades whose work must follow erection of members.
- C. Members shall be properly wrapped for shipment and storage.

3.03 INSTALLATION

- A. Discard units of material with defects that impair quality work, and units that are too small to use in fabricating work with minimum joints or optimum joint arrangement.
- B. Set carpentry work accurately to required levels and lines, with members plumb and true and accurately cut and fitted.
- C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.
- D. Make tight connections between members. Install fasteners without splitting wood: pre-drill as required.
- E. Install prefabricated wood products following the contract documents, approved shop drawings, and manufacturer's instructions.
- F. Do not install prefabricated wood products until supporting construction is in place and is braced and secured.
- G. Hoist prefabricated wood products in place by lifting equipment suited to sizes and types of members required, exercising care not to damage members by out-of-plane bending or other causes.
- H. Install members plumb, square, and true to line and securely fasten to supporting construction.
- I. Space, adjust, and align members in location before permanently fastening.
- J. For floors and roof framing, provide one row of bridging at mid-span for spans over 16 feet, where joist's depth is 16 inches or greater or where the live load exceeds 40 pounds per square foot.
- K. Provide connection to support immediately after setting members as detailed on Structural Drawings. Install bridging, blocking, and connections following manufacturer's recommendations and as shown on drawings as erection progresses and before construction loads are placed on framing members.
- L. Align top chord of joist members between supports by temporary lateral bracing until the sheathing is nailed into place.
- M. Return members that are damaged or do not meet requirements to fabricator and replace with joists that do not meet requirements.
 - 1. Do not alter members in the field.

3.04 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

- A. Provide wherever shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.
- B. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Where occurs, build into masonry during installation of masonry work. Where possible, anchor to form work before concrete placement.
- C. Provide permanent grounds of dressed, preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required.

3.05 INSTALLATION OF ENGINEERED WOOD PRODUCTS

- A. Erect and brace members to comply with recommendations of manufacturer.
 - 1. Erect members with webs vertical (plumb) and parallel to each other. Located accurately at design spacing indicated.
 - 2. Hoist units in place by means of proper lifting equipment suited to size and types of members required, applied at proper lift points as recommended by fabricator, exercising care not to damage members or joints by out-of-plane bending or other causes.
 - 3. Provide temporary bracing as required to maintain plumb, parallel, and in proper location, until permanent bracing in installed.
 - 4. Anchor members securely at all bearing points to comply with methods and details indicated.

END OF SECTION 06 17 00

FINISH CARPENTRY SECTION 06 20 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Finish carpentry.
 - 3. Laying out of work.
 - 4. Cutting and patching required by the work of other trades.
 - 5. Rough hardware including bolts, millwork assembly bolts, nails, etc.
 - 6. Installation of millwork, exposed interior or exterior plywood, wood stop windows, and finish trim, cement board facia members and trim.
 - 7. Installation of toilet room accessories and fixtures.
 - 8. Installation of doors and finish hardware.
 - 9. Gypsum board under or behind accessories or fixtures in fire-rated assemblies.
 - 10. Insulated building caulking.
 - 11. Installation of hollow metal frames, including reinforcing bar and grouting.
 - 12. Filling of exterior thresholds with mastic and sealing of metal door jambs.
 - 13. Submittal preparation.
 - 14. Clean up.

B. Related Sections:

- 1. Section 06 10 00 Rough Carpentry
- 2. Section 07 21 00 Thermal Insulation
- 3. Section 08 11 13 Hollow Metal Doors and Frames
- 4. Section 08 14 16 Wood Doors
- 5. Section 08 71 00 Door Hardware
- 6. Section 10 14 00 Signage
- 7. Section 10 28 00 Toilet Accessories
- 8. Section 10 44 00 Fire Protection Specialties

1.02 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product Data: Provide technical data on each product specified and application instructions.
- C. Samples: For rough carpentry members that will be exposed to view, submit two samples, 12" x 12" in size illustrating wood grain, color, and general appearance.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Lumber shall be surfaced, milled, or worked to patterns, as indicated on the drawings.
- B. Lumber incorporated in the work shall be dried to a maximum moisture content of 15%.
- C. Redwood shall be clear, all heart, Architectural Select.
 - 1. Use stainless steel or Monel metal nails.
- D. Interior wood trim shall be Ponderosa Pine, "C" Select or better, kiln dried.
- E. Interior Plywood shall be A-D Interior Grade, Douglas Fir Plywood, three-eighths inch (3/8") thick minimum, unless noted otherwise.
 - 1. Flame spread shall be Class III of 76-200 and smoke density shall be no greater than 450 when tested in accordance with UBC Standard 8-1 in the way intended for use. (CBC 802.1 and 802.2)
 - 2. Provide fire-treated plywood where indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify all required backing and blocking prior to enclosing framing.
- B. Verify framing or surfaces are acceptable prior to installing finish materials.
 - 1. Preparatory work is complete.
 - 2. Subsurface is plumb, straight, and true.
 - 3. Surface is securely fastened to structure.
 - 4. No blemishes or nail pops.

3.02 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store materials in accordance with the manufacturer's recommendations.
- B. Store materials in a secure dry area in their original packaging until time of installation.

3.03 SEQUENCING AND SCHEDULING

A. Sequence work to prevent damage from subsequent trades.

3.04 INSTALLATION OR APPLICATION

- A. Hollow Metal Doors and Frames and Wood Doors:
 - 1. Install per manufacturer's recommendations and the requirements of the corresponding specification section.
- B. Wood Door Frames:
 - 1. Set plumb, level, true, and square.
 - 2. Joints to be tight.
 - 3. Block or shim behind all items to receive hardware.
 - 4. Set nails for putty.

C. Interior Wood Trim:

- 1. Avoid splicing of material wherever possible.
- 2. Install trim straight, true, and level.
- 3. Joints:
 - a. Inside corners: Butt joint or cope.
 - b. Outside corners: Miter joint.
 - c. End-to-end joints: Not permitted.
- 4. Wood siding and skirting.
 - a. Galvanized "z" flashing at horizontal joints.
- 5. Pitch pockets shall be cut out of exposed wood construction.
- 6. Nail with staggered nailing where possible to prevent splitting.
 - a. Use sufficient nails to hold trim snug and true-to-line.
 - b. Set nails for putty
- D. Casework and Hardware:
 - 1. Install per manufacturer's recommendations and the requirements of the corresponding specification section.
 - a. Refer to casework specifications for California Building Code compliant hardware.
 - 2. Install doors, windows, and casework hardware so that they operate freely without sticking or binding.
 - a. Properly adjust hardware.
 - 3. Set nails for putty.
- E. Miscellaneous Equipment and Hardware:
 - 1. Install per manufacturer's recommendations and the requirements of the corresponding specification section.
 - 2. Use concealed fasteners where possible.

3.05 QUALITY CONTROL

- A. Tolerances:
 - 1. Gaps Around and Between Doors
 - a. Shall not exceed 1/8".
- B. Field Inspection:
 - 1. Inspector of Record.

3.06 CLEANING OR REPAIR

- A. Keep premises clean during the progress of the work.
- B. Thoroughly clean-up work and adjacent areas upon completion of the work.
 - 1. Sweep areas clean, vacuum carpeted areas.
 - 2. Remove tools, excess material, and debris from the site.
- C. Protect this work from damage of any kind until acceptance of the building.
 - 1. All exposed interior lumber shall be protected from sun and weather.

3.07 CONDITION OF FINISHED WORK

- A. Heads and sills of the same height shall line up with each other.
- B. Wood finish shall be surfaced, cleaned, sanded, and ready for finish application.1. No sandpaper marks, hammer marks, or blemishes will be allowed.
- C. Space around doors shall be uniform on both sides and top.
- D. Trim shall be straight and true with uniform reveals around frames and openings.
- E. Glass, hardware, plumbing fixtures, light fixtures, switch plates, service outlets, and grilles shall be clean and in an acceptable condition.

END OF SECTION 06 20 00

INTERIOR ARCHITECTURAL WOODWORK SECTION 06 40 23

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1:
 - Modular-type pre-fabricated cabinet units:
 a. Plastic laminate faced cabinets
 - 3. Countertops:
 - a. Plastic laminate faced countertops
 - b. Solid surface countertops
 - 4. Cabinet hardware.
 - 5. Factory finishing.
 - 6. Preparation for installation of plumbing, HVAC equipment and electrical (power and low voltage).
- B. Related Sections:
 - 1. Section 06 10 00: Rough Carpentry
 - a. Support framing, grounds, and concealed blocking products

1.02 REFERENCE STANDARDS

- A. American National Standards Institute (ANSI)
 - 1. A135.4 American National Standard for Basic Hardboard, 2004.
 - 2. A208.1 American National Standard for Particle Board, 1999.
 - 3. A208.2 American National Standard for Medium Density Fiberboard for Interior Use, 2002.
- B. Architectural Woodwork Manufacturers Association of Canada/Woodwork Institute AWMAC/WI
 - 1. North American Architectural Woodwork Standards (NAAWS), U.S.; Current edition.
- C. Builders Hardware Manufacturers Association (BMHA)
 - 1. BHMA A156.9 Builders Hardware Manufacturers Association; 2010.
- D. American National Standard for Hardwood and Decorative Plywood (HPVA)
 - 1. HPVA HP-1 American National Standard for Hardwood and Decorative Plywood; 2009.
- E. International Organization for Standards (ISO)
 - 1. ISO 4586 High-Pressure Decorative Laminates; latest edition.

- F. National Hardware Lumber Association (NHLA)
 - 1. NHLA G-101 Rules for Measurement & Inspection of Hardwood & Cypress, 2007.
- G. PS -- PRODUCT STANDARDS
 - 1. PS 1 Structural Plywood; 2009.
 - 2. PS 20 American Softwood Lumber Standard; 2015.
- H. Underwriters Laboratories (UL)
 - 1. UL (DIR) Online Certifications Directory; current listings at database.ul.com.
- I. U.S. General Services Administration (GSA)1. CID A-A-1936 Adhesive, Contact, Neoprene Rubber.
- J. Woodwork Institute (WI)1. WI (CCP) Certified Compliance Program (CCP); current edition

1.03 ADMINISTRATIVE REQUIREMENTS

 A. Pre-installation Meeting: Convene a pre-installation meeting not less than one (1) week before starting work of this section; require attendance by all affected installers.

1.04 DEFINITIONS

- A. General:
 - 1. Casework Integrity: Standards are established methods of testing and acceptable minimum levels of integrity for casework per the NAAWS.
 - 2. Hardware: Standards are based upon ANSI/BHMA Standards, Grade 2 as the basic minimum requirement for casework hardware.
 - 3. Cabinet Design Series (CDS): Numbered cabinet designs are used for reference. Refer NAAWS Manual, Appendix for additional information.
 - 4. Grounds, in-wall blocking, backing, or other anchorage that becomes an integral part of the building's walls, floors or ceilings, that are required for the installation of architectural woodwork are not furnished or installed by the architectural manufacturer or installer.
- B. In accordance with the NAAWS Manual surface definitions are as follows:
 - 1. **EXPOSED-EXTERIOR** Surfaces, defined as all exterior surfaces exposed to view, including:
 - a. All surfaces visible when doors and drawers are closed, including knee spaces.
 - b. Underside of cabinet bottoms over 42" above the finished floor, including cabinet bottoms behind light valances and the bottom edge of light valances.
 - c. Cabinet tops under 80" above the finished floor, or if 80" and over and visible from an upper building level or floor.

- d. Front edgeband of stretchers, end, dividers, fixed shelves, tops and bottoms.
- e. Front edgeband of adjustable shelves exposed to view in open casework or behind transparent doors.
- f. Sloping tops of cabinets are visible.
- 2. **EXPOSED-INTERIOR** Surfaces, defined as all interior surfaces exposed to view in open casework or behind transparent doors, including:
 - a. Interior faces of shelves (both fixed and adjustable), dividers (edgeband is an Exposed-Exterior surface).
 - b. Interior face of ends (sides), backs, and bottoms (including pull outs).
 - c. Interior face of cabinet top members 36" or above the finished floor.
 - d. Interior face of doors and applied fronts.
- 3. **SEMIEXPOSED** surfaces, defined as those interior surfaces only exposed to view when the doors or drawers are opened, including:
 - a. Interior faces and edgeband of adjustable shelves.
 - b. Interior faces of dividers.
 - c. Interior face of ends (sides), backs, and bottoms (including a bank of drawers).
 - d. Interior face of cabinet top members 36" or more above the finished floor.

4. **CONCEALED** surfaces, defined as those exterior and interior surfaces that are covered or not normally exposed to view, including:

- a. Toe spaces unless otherwise specified.
- b. Sleepers, stretchers, and solid sub tops.
- c. The underside of cabinet bottoms less than 24: above the finished floor.
- d. The flat tops of cabinets 80" or more above the finished floor, except if visible from an upper floor or building level.
- e. The three non-visible edges of adjustable shelves.
- f. The underside of countertops, knee spaces, aprons, and drawer boxes that are less than 36" above the finished floor.
- g. The faces of cabinet end of adjoining units that butt together.

1.05 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - a. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
 - b. Provide the information required by AWMAC/WI (NAAWS).
 - c. Include Woodwork Institute Certified Compliance label on the first page of shop drawings.
- C. Product Data: Provide data for hardware accessories.

- D. Samples: Submit four (4) actual samples of architectural cabinet construction, minimum 12 inches square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.
- E. Samples: Submit four (4) actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with a minimum of five years of documented experience.
 - 1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
 - 2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
 - 3. Member in good standing with the Woodwork Institute (WI) or the Architectural Woodwork Manufacturers Association of Canada ((AWMAC) and familiar with the AWI/AWMAC QSI.
- B. Quality Certification: Comply with AWMAC/WI (NAAWS) woodwork association quality certification service/program in accordance with requirements for work specified in this section.
 - 1. Provide certificates indicating that the installed work complies with
 - 2. AWMAC/WI (NAAWS) requirements for grade or grades specified. Provide designated labels on shop drawings as required by certification program.
 - 3. Submit certifications upon completion of installation that verifies this work complies with specified requirements.
 - 4. Replace, repair, or rework all work for which certification is refused.
 - 5. All fees charged (if any) by the Woodwork Institute for their Certified Compliance Program (CCP) are the responsibility of the millwork manufacturer and/or installer and shall be included in their bid.

1.07 MOCK-UP

- A. Provide mock-up of typical base cabinet, wall cabinet, and countertop, including hardware, finishes, and plumbing accessories.
- B. See Section 01 40 00 "Quality Requirements" for additional requirements.
- C. Locate where directed.
- D. Mock-up may remain as part of the Work.

1.08 PROJECT CONDITIONS

A. During and after installation of casework, maintain temperature and humidity conditions in building spaces at same levels as planned for occupancy.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials only when the project is ready for installation and the General Contractor/Construction Manager has provided a clean storage space.
 - Delivery of architectural woodwork shall be made only when the area of operation is enclosed, all plaster and concrete work is dry and the area broom clean.
 - 2. Maintain indoor temperatures humidity within the delivery and installation with the General Contractor/Construction Manager and other applicable trades.
 - 3. Store indoors, in ventilated areas with constant but minimum temperature of 60 degrees F. and maximum relative humidity of 25 percent to 55 percent. Do not install casework until the building is enclosed and ambient conditions are within the temperature and humidity range to be expected during occupancy. Acclimatize materials to the installation temperature and humidity for at least 72 hours prior to installation. Maintain conditions until Notice of Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Substitutions: See Section 01 60 00 Product Requirements.
- B. Single Source Responsibility: Provide and install this work from single fabricator.

2.02 PLASTIC LAMINATE FACED CABINETS

- A. Quality Standard: Custom Grade, in accordance with AWMAC/WI (NAAWS),
- B. Section 10 "Casework" unless noted otherwise.
 - 1. Laminate Manufacturers:
 - 2. Wilsonart; www.wilsonart.com.a. Basis of Design: Wilsonart, Traceless "Silk Velvet" 15513
 - 3. Formica Corporation; www.formica.com.
 - 4. Substitutions: See Section 01 60 00 Product Requirements.
- C. Cabinets:
 - 1. Cabinet Core Material: Medium Density Fiberboard (MDF).
 - 2. Finish Exposed Exterior Surfaces: Decorative laminate.
 - 3. Finish Exposed Interior Surfaces: Decorative laminate.

- 4. Finish Concealed Surfaces: Cabinet liner or melamine.
- 5. Door and Drawer Front Edge Profiles: Square edge with thin applied band.
- 6. Door and Drawer Front Retention Profiles: Fixed panel.
- 7. Casework Construction Type: Type A Frameless.
- 8. Interface Style for Cabinet and Door/Drawer Fronts: Flush Overlay
- 9. Grained Face Layout for Cabinet and Door Fronts: Flush panel.
 - a. Premium Grade:
 - 1) Provide vertical run and match for doors, drawer fronts and false fronts within each cabinet unit.
 - 2) Provide well-matched doors, drawer fronts and false fronts across multiple cabinet faces in one elevation.
 - 3) Cathedral Grain: Point grain crown up and run in the same direction for entire project.
- 10. Cabinet Design Series: As indicated on drawings.
- 11. Adjustable Shelf Loading: 50 lbs. per sq. ft.
 - a. Deflection: L/144.
- 12. Drawer Side Construction: Solid birch hardwood, with dovetail construction. Drawer boxes to be finished with clear water-based lacquer
- 13. Drawer Construction Technique: Dovetail joints.
- D. High Pressure Decorative Laminate (HPL): ISO 4586, types as recommended for specific applications.
- E. Provide specific types as scheduled.
 - 1. Horizontal Surfaces: HTS, 0.048-inch nominal thickness, through color, colors as scheduled, finish as scheduled.
 - 2. Vertical Surfaces: VGS, 0.028-inch nominal thickness, through color, colors as scheduled, finish as scheduled.
 - 3. Post-Formed Horizontal Surfaces: HGP, 0.039-inch nominal thickness, through color, colors as scheduled, finish as scheduled.
 - 4. Post-Formed Vertical Surfaces: VIP, 0.028-inch nominal thickness, through color, colors as scheduled, finish as scheduled.
 - 5. Flame Retardant Surfaces: HGF, 0.048-inch nominal thickness, through color, colors as scheduled, finish as scheduled.
 - 6. Cabinet Liner: CLS, 0.020-inch nominal thickness, through color, colors as scheduled, finish as scheduled.
 - 7. Laminate Backer: BKL, 0.020-inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.

2.03 PLASTIC LAMINATE FACED COUNTERTOPS

A. Quality Standard: Premium Grade, in accordance with AWMAC/WI (NAAWS), Section 11 "Countertops and Horizontal Surfaces" unless noted otherwise.

- B. Manufacturers:
 - 1. Wilsonart; www.wilsonart.com.
 - a. Basis of Design: Wilsonart, "Oiled Soapstone" #4882-38, Fine Velvet Finish
 - 2. Formica Corporation; www.formica.com.
 - 3. Substitutions: See Section 01 60 00 Product Requirements.
- C. Countertop Core Material: Medium Density Fiberboard (MDF), moistureresistant MDF Grade MR 50 at sink countertops.
- D. Plastic Laminate Countertops: Medium density fiberboard substrate covered with HPL, conventionally fabricated and self-edge banded.
 - 1. **Cutouts** have a minimum of 1/8" radius at inside corners, with edges subject to moisture sealed with a color-toned (for verification), water-resistant sealer before trim or sink rims are installed.
 - 2. **Coved Splashes** of 1/4" +/-1/16" radius, requiring a square cove stick the same thickness as the core material with voids filled with glue between the HPL and the cove stick.
 - 3. **Drip Groove** to be a continuous 1/8" x 1/8" groove 3/8" +/-1/16" from the front edge, smoothly sanded and sealed with a color-toned (for verification) water -resistant sealer.
 - 4. Miter-Fold is not permitted.
 - 5. **Backing Shee**t to cover the underside of countertops, the backside of splashes and be the same material for the entire project.
 - 6. **Laminations** to be made securely to the core with moisture resistant adhesive applied as recommended by the adhesive material supplier, and adhesive for solid color core laminate application will conform to material supplier's recommendation.
 - 7. HPL Edge be applied before top laminate.
 - 8. **L-Shaped** countertops may be butt jointed except at wood grain or directional pattern which require an approximate 45° diagonal joint.
 - 9. Shop Prepared Field Joints will be fabricated with splines, biscuits or dowels and draw-bolt-type mechanical fasteners.
 - 10. **Shop Assembled Joints** will be glued and fastened together with splines or dowels and draw-bolt-type mechanical fasteners.

2.04 SOLID SURFACE COUNTERTOPS

- A. Manufacturers:
 - 1. Dupont, Corian Solid Surface:
 - a. Basis of Design, Countertops (Reception): Carbon Aggregate
 - 2. Formica; Everform Solid Surface
 - 3. Wilsonart
 - 4. Substitutions: See Section 01 60 00 "Product Requirements"

- B. 3/4" thick countertop of polyester-acrylic blend solid surfacing material cast to desired profiles and sizes having edge details as indicated on Drawings conforming to CSA B45.5/IAPMO Z124.
 - 1. **Manufactured Joints** will be precision-machined and glued with material supplier's hard seaming material or equal. Silicone is not permitted at joints, except where hot areas meet cold areas.
 - 2. **Edge Detail** required either miter-fold, single drop or build up of manufacturers' profile, dimension as indicated on drawings.
 - 3. **Joints** at L-shaped tops with a grain or pattern appearance will have an approximate 45° diagonal joint, butt joints are not permitted.
 - 4. Exposed Finish will be manufacturer's standard matte finish.
 - 5. Expansion Clearances of at least 1/8" will be provided.
 - 6. **Sealants/Adhesives**, as recommended by individual material suppliers, will be used to achieve the best performance and color match.
 - 7. **Cantilevers**, with or without a sub-top, will not exceed 12" for 3/4" or 6" for 1/2" thick material, whether in the front, back of end.
 - 8. **Veined/Swirled** sold surface may have random patterns that cannot be matched at seams. Pattern breaks, pattern changes and color variations may occur, and will not be considered a defect in materials or workmanship.
 - 9. **Top and Backsplash** shall be same material/color as selected by Architect.
- C. Provide countertops complete with backsplashes of size shown on drawings. Ensure the top and backsplash is a single color coved as selected by Architect.

2.05 ACCESSORIES

- A. Adhesive shall be Type II- Water-resistant interior.
 - 1. Manufacturers:
 - a. Franklin International, Inc; Titebond Original Wood Glue.
 - b. Or approved equal. See Section 01 60 00 "Product Requirements" for substitution procedures.
- B. Plastic Edge Banding: Extruded PVC, smooth finish; of width to match component thickness.
 - 1. Color: As selected by Architect from manufacturer's standard range.
 - 2. Use 3 mm thick for doors and drawer fronts.
 - 3. Use 3 mm thick for front edge of adjustable shelves.
 - 4. Use 1 mm or .5 mm thick for cabinet body.
- C. Fasteners: Size and type to suit application.
- D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.

- E. Concealed Joint Fasteners: Threaded steel.
- F. Grommets: Standard plastic, painted metal, or rubber grommets for cut-outs, in color to match adjacent surface.

2.06 HARDWARE

- A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.
 - 1. Grade 1: Schools and Hospitals.
- B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated self-rests, polished chrome finish, for nominal 1-inch spacing adjustments. Shelf clips for adjustable shelves that can be installed at or above 48" shall be earthquake-resistant type (pins or screws installed).
 - 1. Product: Knape & Vogt; 345/348
 - 2. Or approved equal, refer to Section 01 60 00 "Product Requirements".
- C. Drawer and Door Pulls: "U" shaped wire pull, steel with chrome finish, 4-inch centers.
 - 1. Product: Pride Industrial LLC; P-355.SC.
 - 2. Or approved equal, refer to Section 01 60 00 "Product Requirements".
 - 3. Pulls shall meet CBC 11B-309.4 and 11B-404.2.7.
- D. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with chrome finish.
 - 1. Product: Olympus Lock, Inc.; 100DR/ 200d.
 - 2. Or approved equal, refer to Section 01 60 00 "Product Requirements".
- E. Catches: Magnetic.
 - 1. Product: Engineered Products Co.; EPCO 592.
 - 2. Or approved equal, refer to Section 01 60 00 "Product Requirements".
- F. Drawer Slides:
 - 1. Type: Full extension ball-bearing type.
 - 2. Static Load Capacity: Heavy duty grade (100lbs.) minimum
 - 3. Mounting: Side mounted.
 - 4. Stops: Integral type.
 - 5. Features: Provide self-closing/stay closed type.
 - 6. Product:
 - a. Accuride International, Inc; 3832 (100 lbs.). Typical drawers.
 - b. Accuride International, Inc: 4034 (150 lbs.). File drawers up to 30" in width.
 - c. Knape & Vogt Manufacturing Company; 8450 (100 lbs.). Typical drawers.

- d. Knape & Vogt Manufacturing Company; 8505 (150 lbs.). File drawer up to 30" in width.
- e. Or approved equal, refer to Section 01 60 00 "Product Requirements".
- G. Hinges (minimum 155° of opening capacity): Semi-concealed self-closing type, steel with polished finish.
 - Product: Rockford Process Control, Inc.: 374 Institutional / Overlay 5 Knuckle
 - 2. Or approved substitution. Section 01 60 00 "Product Requirements".

2.07 FABRICATION

- A. Fabrication and assembly of casework shall be in accordance with AWMAC/WI (NAAWS), Section 10 "Casework" unless noted otherwise.
- B. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- C. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- D. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- E. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
 - 1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
 - 2. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- F. Mechanically fasten back splash to countertops as recommended by laminate manufacturer at 16 inches on center.
- G. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

2.08 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. For opaque finishes, apply wood filler in exposed nail and screw indentations and sand smooth.
- C. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

- A. Install work in accordance with AWMAC/WI (NAAWS), Section 14 "Installation" requirements for grade indicated.
- B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- C. Use fixture attachments in concealed locations for wall mounted components.
- D. Use concealed joint fasteners to align and secure adjoining cabinet units.
- E. Carefully scribe casework abutting other components, with maximum gaps of 1/32". Do not use additional overlay trim for this purpose.
- F. Secure cabinets to the floor using appropriate angles and anchorages.
- G. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood, finish flush with surrounding surfaces.

3.03 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION 06 40 23

THERMAL INSULATION SECTION 07 21 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Above-ground thermal insulation shown on drawings, and as required to form a complete insulation envelope.
 - 3. Above-ground sound insulation shown on drawings.
 - 4. Floor insulation under slab where shown.
 - 5. Caulking.
 - 6. Submittal preparation.
 - 7. Clean up.

B. Related Sections:

- 1. Section 05 41 00 Structural Metal Stud Framing
- 2. Section 06 10 00 Rough Carpentry
- 3. Section 07 21 29 Sprayed Insulation
- 4. Section 09 22 16 Non-Structural Metal Framing

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM C578 Standard Specification for Rigid, Cellular Polystyrene thermal Insulation.
 - 2. ASTM C665 Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame construction and Manufactured Housing.
 - 3. ASTM C764 Standard Specification for Mineral Fiber Loose-Fill Thermal Insulation.
 - 4. ASTM E84 Standard Test method for Surface Burning Characteristics.
 - 5. ASTM E136 Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750° C.
- B. National Fire Protection Association (NFPA)
 - 1. NFPA 259 Standard Test Method for Potential heat of Building materials.
 - 2. NFPA 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components.
 - 3. NFPA 286 Standard Fire Test Method for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product Data: Submit insulation manufacturer's product data, building code compliance reports or test reports and the insulation manufacturer's printed installation guidelines.
 - 1. Submit data for each type of insulation specified.
 - 2. Submit data for sustainable design:
 - a. Recycled content.
 - b. Adhesives indicating VOC content.
 - c. Lab test reports indicating requirements for low-emitting materials.
 - 3. Submit data for certification of listing type, manufacturer, and R-value of insulation in each application of the building thermal envelope.

1.04 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Insulation shall comply with California Quality Standards for Insulating Materials.
- B. Qualifications:
 - 1. Manufacturers: Company specializing in manufacturing products specified in this section with not less than five years documented experience.
 - 2. Installers: Company specializing in installation manufactured products in this section with not less than five years documented experience.

1.05 DELIVERY, STORAGE AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Certainteed.
- B. Johns Manville.
- C. Owens Corning.
- D. Or approved equal.

2.02 MATERIALS

- A. General:
 - 1. Insulation shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers".
 - a. Use of formaldehyde shall not be permitted.
 - 2. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than xx percent.
- B. Thermal Insulation Above Grade (concealed):
 - 1. Glass-Fiber Blanket Insulation, Unfaced: ASTM C665, Type I: passing ASTM E136 for combustion characteristics:
 - a. Flame spread rating of less than 25 when tested in accordance with ASTM E84.
 - b. Smoke density of less than 50 when tested in accordance with ASTM E84.
 - c. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12" and wider in width.
 - d. Rating requirements may be reduced when allowed by specific exception per the CBC.
- C. Thermal Insulation Above Grade (exposed):
 - 1. Glass-Fiber Blanket Insulation, Kraft Faced: ASTM C665, Type II (nonreflective faced, Class C (faced surface not rated for flame propagation): Category 1 (membrane is a vapor barrier):
 - a. Flame spread rating of less than 25 when tested in accordance with ASTM E84.
 - b. Smoke density of less than 50 when tested in accordance with ASTM E84.
 - c. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12" and wider in width.
 - d. Rating requirements may be reduced when allowed by specific exception per the CBC.
- D. Thermal Insulation Above Grade (part of a fire-rated assembly):
 - 1. Glass-Fiber Blanket Insulation, Foil Faced: ASTM C665, Type III (reflective faced, Class B (faced surface with flame propagation): Category 1 (membrane is a vapor barrier), faced with foil scrim, foil scrim kraft, or foil-scrim polyethylene:
 - a. Flame spread rating of less than 25 when tested in accordance with ASTM E84.
 - b. Smoke density of less than 50 when tested in accordance with ASTM E84.
 - c. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12" and wider in width.
 - d. Rating requirements may be reduced when allowed by specific exception per the CBC.

- E. Floor Insulation (Under Slab):
 - 1. Extruded Polystyrene Board Insulation: Type X; ASTM C578, Type X, 15- psi minimum compressive strength unfaced.
 - a. Flame spread rating of less than 25 when tested in accordance with ASTM E84.
 - b. Smoke density of less than 450.
 - c. Per CBC standard #8-1.
 - d. Or approved equal.
 - 1) Molded bead type or polyisocyanurate will not be accepted.
- F. Exterior Wall Insulation:
 - 1. Reinforced foil faced fiberglass batt insulation, unless noted or scheduled otherwise.
 - a. R=21 FSK-25, unless noted otherwise.
 - b. Where allowed by code, Kraft paper faced batt insulation may be used only when wall cell is completely enclosed by framing and finishes.
 - 1) No space shall exist between the paper face and the wall finish.
- G. Roof/Ceiling Insulation:
 - 1. Reinforced foil-faced fiberglass batt insulation, unless noted or scheduled otherwise.
 - a. Batt insulation shall be of width required to be one piece between ceiling or roof joists.
 - b. R=30, 11" thick, FSK-25, unless noted otherwise.
 - c. Where allowed by code, Kraft paper-faced batt insulation may be used in attics when installed in non-rated assemblies where insulation is on the ceiling. The Kraft paper side shall be installed tight to the ceiling gypsum board.
 - 1) No space shall exist between the paper face and the finish.
- H. Sound Insulation:
 - 1. Interior wall sound insulation.
 - a. Glass-fiber insulation as shown on the Drawings, around all offices, classrooms, restrooms, and restroom ceilings.
 - b. R=19, 5 1/2" thick unless noted otherwise.
- I. Fasteners
 - 1. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.
 - Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 a. AGM Industries, Inc.
 - b. Midwest Fasteners, Inc.
 - c. Or approved equal.
- 2. Plate: Perforated, galvanized carbon-steel sheet, 0.030" thick by 2" square.
- 3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.150" in diameter length to suit depth of insulation.
- 4. Insulation-Retaining Washers: Self-locking washers formed from 0.016" thick galvanized -steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less the 1-1/2" square or diameter.
- 5. Anchor Adhesive: Product with demonstrated capacity to bond insulation anchors securely to substrates without damaging insulation, fasteners or substrates.
- J. Accessories
 - 1. Insulation for Miscellaneous Voids:
 - a. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flamespread and smoke-developed indexes of 5, per ASTM E84.
 - 2. Adhesives for Bonding Insulation:
 - a. Provide compatible insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.
 - 1) Adhesives shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers".
 - a) Use formaldehyde shall not be permitted.
 - 2) Adhesives shall have a VOC content of 70 g/L or less.
 - 3. Asphalt Coating for Cellular -Glass Block Insulation: Cutback asphalt or asphalt emulsion of type recommended by manufacturer of cellular-glass block insulation.
 - 4. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Contractor shall examine conditions under which insulation work is to be performed.
 - 1. Do not install materials where unsatisfactory support conditions exist.
 - 2. Notify Architect of such unsatisfactory conditions.

3.02 PREPARATION

- A. Clean substrata prior to installation of materials.
- B. Remove or repair conditions that may puncture vapor barrier.

3.03 INSTALLATION

- A. Comply with the manufacturer's latest written recommendations.
 - 1. Consult manufacturer's technical representative for conditions not covered in written recommendations.
- B. Insulation shall form a complete thermal envelope around all interior spaces.
 - 1. Typical areas to be insulated:
 - a. Exterior walls.
 - b. Attics:
 - c. Interior partitions and ceilings where shown.
 - d. Restroom walls and ceilings (above framed ceilings only).
 - e. Furring at acoustical panels.
 - f. Below cold storage room finish slabs.
 - g. Areas shown to receive insulation on the drawings.
 - 2. Small Areas:
 - a. Fill small voids with insulation to provide a complete thermal envelope.
 - b. Fill hollow metal frames with insulation to provide a complete thermal envelope.
 - 3. Piping, Conduits, or Boxes in Walls:
 - a. Fit insulation around obstruction.
 - b. Place between obstruction and exterior wherever possible.
 - 4. Insulation shall be a single layer of the shown or specified thickness, unless noted otherwise.
 - 5. Insulation shall be installed without compressing the material.
 - a. Fluff out insulation so that the facing will be tight against the wall sheathing.
 - b. Prevent voids that will create convection currents within the wall.
- C. Sound Insulation shall form a complete sound wall between rooms indicated.
 - 1. Typical areas to be insulated:
 - a. Full height of interior structural walls where shown.
 - b. Full height of interior partitions ceilings where shown.
 - 2. Small Areas:
 - a. Fill small voids with insulation to provide a complete sound envelope.
 - b. Fill hollow metal frames with insulation to provide a complete sound envelope.
 - 3. Piping, Conduits, or Boxes in Walls:
 - a. Fit insulation around obstruction.
- D. Vapor Barriers:
 - 1. Place vapor barriers on the inside of the insulation envelope, unless shown otherwise.
 - 2. Batt insulation shall be installed tight to the underside of roof deck or wall finish material, unless noted otherwise.
 - 3. Facing flanges shall be stapled to adjacent framing wherever possible.

3.04 PROTECTION

- A. Protect insulating materials from exposure to moisture or to physical damage.
- B. Protect adjacent finishes and the work of other trades.

3.05 CLEANING AND REPAIR

- A. Keep premises clean during the progress of the work.
- B. Thoroughly clean-up work and adjacent areas upon completion of the work.1. Sweep areas clean.
- C. Repair damage that may have occurred to insulating materials.
 - 1. Tape any tears in facing material with materials of equal flame spread characteristics.
- D. Repair damage to adjacent materials or the work of other trades as a result of the work of this Section.

END OF SECTION 07 21 00

UNDER-SLAB VAPOR BARRIER SECTION 07 26 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Vapor barrier and installation accessories for installation under concrete slabs.
 - 2. Submittal Preparation.
 - 3. Clean-up.
- B. Related sections:
 - 1. Section 03 31 00 Structural Concrete Work

1.02 REFERENCES

- A. ASTM International:
 - 1. ASTM E1643-18a: Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
 - 2. ASTM E1745-17: Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
- B. American Concrete Institute (ACI):
 - 1. ACI 302.1R-15: Guide to Concrete Floor and Slab Construction.
 - 2. ACI 302.2R-06: Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirement" for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instruction and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.

1.04 QUALITY ASSURANCE

- A. Certifications:
 - 1. Submit material certification for admixtures and aggregates, certifying their compliance with specifications.
 - 2. Submit certified mill test reports for lot of cement.
 - 3. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1

- B. Contact vapor barrier manufacturer to schedule a pre-construction meeting and to coordinate a review, in-person or digital, of the vapor barrier installation.
- C. Vapor barrier manufacturers must warrant in writing (a) compliance with the designated ASTM E1745 classification, and (b) no manufacturing defects in the product for at least ten (10) years.
- D. Manufacturers verify in writing 20 years in the industry with no reported product failures.

1.05 PRE-INSTALLATION CONFERENCE

- A. Conduct pre-installation conference in accordance with Section 01 30 00 "Administrative Requirements".
 - 1. Contact membrane vapor barrier manufacturer to participate in pre-installation conference and coordinate a review, in-person or digital, of the vapor barrier installation prior to concrete placement.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General:
 - 1. Basis of Design: Stego Wrap Vapor Barrier by Stego Industries LLC., (877) 464-7834 www.stegoindustries.com.
- B. Manufacturers/Vapor barrier products:
 - 1. Stego Industries LLC., Stego Wrap Vapor Barrier
 - 2. W.R. Meadows, Perminator
 - 3. Fortifiber, Moistop Ultra
 - 4. Or approved equal.
- C. Vapor barrier shall have the following minimum requirements:
 - 1. Maximum Permeance: Maintain permeance of less than 0.01 Perms grains/(ft² · hr · inHg) as tested in accordance with mandatory conditioning tests per ASTM E1745
 - Section 7.1 (7.1.1-7.1.5).
 - 2. Water Vapor Barrier: ASTM E1745, Class A.
 - 3. Thickness: 15 mils minimum (ACI 302.1R-15)
 - 4. All testing shall be performed on a single production roll per ASTM E1745 Section 8.1.

2.02 ACCESSORIES

- A. All accessoires used must be from the same manufacturer of the vapor barrier material to ensure a cohesive, compatible system.
 - 1. Seams:
 - a. Stego Tape by Stego Industries
 - b. Or approved equal.
 - 2. Sealing Penetrations of Vapor barrier:
 - a. Stego Mastic by Stego Industries
 - b. Stego Tape by Stego Industries
 - c. Or approved equal.
 - 3. Perimeter/terminated edge seal:
 - a. Stego Crete Claw (textured tape) by Stego Industries
 - b. Stego Term Bar by Stego Industries
 - c. StegoTack Tape (double-sided sealant tape) by Stego Industries
 - d. One-sided seaming tape is not a recommended method of sealing at the terminated edge.
 - e. Or approved equal.
 - 4. Penetration Prevention:
 - a. Beast Foot by Stego Industries
 - b. Or approved equal.

PART 3 EXECUTION

3.01 PREPARATION

- A. Under-slab Vapor Barrier
 - 1. Ensure that subsoil is approved by Architect or Geotechnical Engineer.
 - 2. Level and compact base material.
 - 3. Install vapor barrier in accordance ASTM E1643.
- B. Contact vapor barrier manufacturer to schedule a pre-construction meeting and to coordinate a review, in-person or digital, of the vapor barrier installation.

3.02 INSTALLATION

- A. Install vapor barrier in accordance ASTM E1643.
 - 1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
 - 2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, water stops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.

- a. Seal vapor barrier to the entire slab perimeter using manufacturer's textured tape with a surface that creates a mechanical seal to freshly placed concrete, per manufacturer's instructions. OR
- b. Seal vapor barrier to the entire perimeter wall or footing/grade beam with manufacturer's double-sided tape, or both termination bar and double-sided tape, per manufacturer's instructions. Ensure the concrete is clean and dry prior to adhering tape.
- 3. Overlap joints 6 inches and seal with manufacturer's seam tape.
- 4. Apply seam tape/textured tape/double-sided tape to a clean and dry vapor barrier.
- 5. Seal all penetrations (including pipes) per manufacturer's instructions.
- 6. Avoid the use of stakes driven through vapor barrier by utilizing screed and forming systems that will not puncture the vapor barrier.
- 7. Use reinforcing bar supports with base sections that eliminate or minimize the potential for puncture of the vapor barrier.
- 8. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.
- 9. Utilize vapor barrier sealing accessories from the same manufacturer as the vapor barrier membrane.

END OF SECTION 07 26 00

SHEET METAL FLASHING AND TRIM SECTION 07 62 00

PART 1 GENERAL

1.01 SUMMARAY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Sheet metal work:
 - a. Metal edging, splash pans, drip flashing, diverters, scuppers, etc.
 - b. Counter-flashing, patent flashing.
 - c. Louvers, screens, grilles, etc.
 - d. Expansion joints not included in other sections.
 - e. Clips and fasteners for sheet metal work and trim.
 - f. Sheet metal reveals or accents.
 - 3. Aluminum work not included in other sections.
 - 4. Stainless steel work not included in other sections.
 - 5. Submittal preparation.
 - 6. Clean up.

B. Related Sections:

- 1. Section 07 72 00 Roof Accessories
- 2. Section 23 00 00 Heating Ventilating & Air-Conditioning

1.02 PERFORMANCE REQUIREMENTS

- A. Flashing Systems:
 - 1. Completed work shall, in conjunction with roofing, doors, windows, equipment, and building finish materials, form a complete barrier against water.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product Data:
 - 1. Submit copies of product data and installation recommendations of standard commercial items proposed for use on this project.
- C. Shop Drawings or Layout Drawings:
 - 1. Submit copies of shop drawings to the Architect for review prior to beginning fabrication.
 - a. Show details, joint configurations, anchorage, and materials used.
 - b. Flashing Systems:
 - a. Completed work shall, in conjunction with roofing, doors, windows, equipment, and building finish materials, form a complete barrier against water.

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1.04 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Comply with latest published recommendations found in the Architectural Sheet Metal Manual published by the Sheet Metal and Air Conditioning Contractor's National Association.
 - 2. Comply with manufacturer's recommendations.
- B. Roofing Pre-Application Meeting:
 - 1. A representative of the contractor shall attend to coordinate the application of roof-related items.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Galvanized Sheet Steel:
 - 1. Use 24-gauge minimum thickness material, unless otherwise noted.
 - 2. Material shall be copper bearing with heavy galvanized finish.
 - a. Hot dip galvanized.
 - b. Minimum coating weight of 1.25 oz./sf.
 - c. Conform to ASTM A-525.
- B. Exposed Formed Flashings:
 - 1. 24 ga. Galvalume 55% Al-Zn) with factory applied Kynar 500 fluoropolymer coating.
 - 2. Color selected by Architect.
- C. Sheet Aluminum:
 - 1. Use 0.040-gauge minimum thickness material, unless otherwise noted.
 - 2. Material shall be Alcoa aluminum, 35 alloy alumilite satin finish, unless noted otherwise.
- D. Stainless Steel:
 - 1. U.S. Steel 18-8 No. 302, with #4 finish.
- E. Solder shall comply with ASTM B-32.
 - 1. Flux shall be raw muriatic acid.

F. Louvers shall be made of galvanized formed steel.

- 1. Construct of the following minimum size materials:
 - a. Blades: 20 gauge minimum.
 - b. Frame: 18 gauge minimum.
- 2. Include bird/insect screens.
 - a. Ruskin #L811 or equal.
- 3. Louvers shall have factory color finish.
 - a. Color selected by Architect.

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SHEET METAL FLASHING AND TRIM

2.02 ATTACHMENTS

- A. Nails:
 - 1. Nails shall be galvanized.
- B. Rivets:
 - 1. Soft annealed non-corrosive type with rust-resistant coating.
- C. Screws:
 - 1. Screws and washers shall be cadmium plated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify all required backing and blocking prior to enclosing framing.
- B. Verify framing or surfaces are acceptable prior to installing finish materials.
 - 1. Preparatory work is complete.
 - 2. Subsurface is plumb, straight, and true.
 - 3. Surface is securely fastened to structure.
 - 4. Field verify dimensions.
 - 5. Solder joints in shop-controlled conditions where possible.

3.02 PREPARATION

- A. Fabrication:
 - 1. Provide adequate laps to allow for material expansion and contraction.
 - 2. Exposed edges shall be turned back and hemmed 1/2".
 - 3. Solder joints shall be thoroughly cleaned with acetone to a decreased, cleaned condition prior.
- B. Coordinate work with the schedules of other trades affected by this work.

3.03 INSTALLATION OR APPLICATION

- A. Sheet metal work in connection with roofs shall be set in a solid bed of approved sealant material.
- B. Fasteners:
 - 1. Wherever possible, use concealed clips or cleats in lieu of exposed fasteners.
 - 2. Fastener spacing shall not exceed 8", unless noted otherwise.
- C. Accurately form materials to fit together neatly and accurately to form an effective watertight seal.
 - 1. Materials shall fit together to form true, straight lines and angles.

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D. Counter flash corner joints and set in sealant as required to form watertight seams.

E. Soldering:

- 1. Pre-trim edges of sheet metal prior to soldering.
- 2. Apply flux immediately prior to soldering to each surface.
- 3. Apply soldering iron to material until thoroughly heated and the solder has been completely sweated through the full width of the seam.
- 4. After soldering, all residual flux shall be removed with a solution of washing soda in water.
- 5. In areas where water can accumulate, such as gutters, scuppers, and diverters, joints shall be soldered.

3.04 QUALITY CONTROL

- A. Field Testing:
 - 1. Running or standing water testing may be required of the work of this Section to demonstrate water tightness of work.
- B. Use full lengths of material to minimize the number of joints.
- C. Sheet metal and accessories shall be left free of dirt, grease, acids, or other compounds which may inhibit the proper bonding of paint finishes.

END OF SECTION 07 62 00

ROOF ACCESSORIES SECTION 07 72 00

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

- 1. Provisions set forth in Divisions 0 and 1.
- 2. Roof / gravity vents.
- 3. Smoke Hatches.
- 4. Vent, electrical, and plumbing roof jacks.
- 5. Associated accessories and hardware.
- 6. Submittal Preparation.
- 7. Clean up.

B. Related Sections:

- 1. Section 06 10 00 Rough Carpentry
- 2. Section 07 62 00 Sheet Metal Flashing and Trim

1.02 REFERENCES

- A. SMACNA Architectural Sheet Metal Manual.
- B. NRCA National Roofing Contractors Association

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product or Material Data:
 - 1. Submit copies of manufacturer's product specifications, installation instructions, and product recommendations.
- C. Samples or Mockups:
 - 1. At the request of the Architect, submit one (1) sample of proposed products for approval.
 - a. If approved, the sample may be incorporated into the work.
 - b. If not approved, the sample will be returned to Contractor.

1.04 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Unless otherwise noted, comply with the SMACNA Architectural Sheet Metal Manual.
 - 2. Roof hatches shall meet CAL-OSHA requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 3. Roof Vents:
 - a. Bristolite.
 - b. Or approved equal.
 - 4. Prefabricated Roof Jacks:
 - a. Orbit Industries, Inc.
 - b. Or approved equal.

2.02 MATERIALS

- B. Roof Vents:
 - 1. Mount on 18-gauge galvanized iron sheet metal curb or 6063-T5 aluminum.
 - a. Unit to be complete with bird screen.
 - b. Unit shall be shop-primed, ready for painting.
 - 2. Products:
 - a. Bristolite: #2237 EIP-CM-3
 - b. Or approved equal.
- C. Roof Jacks:
 - 1. Roof jacks shall be 24 ga. galvanized sheet metal.
 - a. Orbit Industries, Inc. Series RJ, sized as required.
 - b. Or approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify all required curbs, backing, and blocking prior to enclosing framing.
- B. Start of work shall be considered as acceptance of existing conditions.

3.02 INSTALLATION OR APPLICATION

- A. Install per the manufacturer's latest written recommendations.
- B. Roof jacks shall be installed in watershed fashion with the roof covering set in a complete bed of roof mastic. The top of roof jack shall be sealed to the pipe or conduit with a double layer of aluminum tape. Clean and degrease areas required for proper tape adhesion. All roof jacks exposed to view shall be painted per Section 09 91 13 "Exterior Painting".

3.03 CONDITION OF FINISHED WORK

- A. The completed installation shall be clean, neatly finished, with no visible imperfections.
- B. All work shall be watertight soldered connections.

END OF SECTION 07 72 00

JOINT SEALANTS SECTION 07 92 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Building-related joint sealants.
 - 3. Joint primer and filler.
 - 4. Interior joint sealant required to prevent passage of moisture into wall assemblies or behind fixtures and built-in furnishings.
 - 5. Surface preparation.
 - 6. Application and curing.
 - 7. Submittal preparation.
 - 8. Clean up.

B. Related Sections:

- 1. Section 03 31 00 Structural Concrete Work
- 2. Section 04 22 00 Reinforced Concrete Unit Masonry
- 3. Section 06 20 00 Finish Carpentry
- 4. Section 06 40 23 Interior Architectural Woodwork
- 5. Section 08 11 13 Hollow Metal Doors and Frames
- 6. Section 08 41 13 Aluminum-Framed Entrances and Storefronts
- 7. Section 08 81 00 Glass and Glazing
- 8. Section 09 21 16 Gypsum Board Assemblies
- 9. Section 09 91 13 Exterior Painting
- 10. Section 09 91 23 Interior Painting

1.02 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM C510 Standard Test Method for Staining and Color Change of Singleor Multicomponent Joint Sealants.
 - 2. ASTM C639 Standard Test Method for Rheological (Flow) Properties of Elastomeric Sealants.
 - 3. ASTM C661 Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer.
 - 4. ASTM C679 Standard Test Method for Tack-Free Time of Elastomeric Sealants.
 - 5. ASTM C719 Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
 - 6. ASTM C793 Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants.

- 7. ASTM C794 Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.
- 8. ASTM C920 Standard Specification for Elastomeric Joint Sealants.
- ASTM C1382 Standard Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems (EIFS) Joints.
- 10. ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers Tension.
- 11.ASTM D2240 Standard Test Method for Rubber Property Durometer Hardness.
- B. California Department of Public Health
 - 1. Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers.
- C. NSF International (NSF)
 - 1. Standard 51 Food Equipment Materials.
- D. Sealant, Waterproofing, and Restoration Institute (SWRI).
 - 1. SWRI Validation Program.
- E. U.S. Environmental Protection Agency (EPA)
 - 1. 40 CFR 59, Subpart D National Volatile Organic Compound Emission Standards for Architectural Coatings.
- F. U.S. Food and Drug Administration (FDA)
 - 1. 21 CFR 177.2600 Title 21 Part 177 Indirect Food Additives: Polymers.
- G. US Green Building Council (USGBC)
 - 1. Leadership in Energy and Environmental Design (LEED) Green Building Rating System.

1.03 SUBMITTALS

- A. Product or Material Data:
 - 1. Manufacturer's Data:
 - a. Submit a complete material listing of items proposed to be installed under this Section.
 - b. Submit data to demonstrate that all materials meet or exceed the specified requirements.
 - c. Submit product specifications, installation instructions, and manufacturer's recommendations for the materials that will be installed.
- B. Samples: Two (2) representative units of each type, size, pattern, and color.
- C. Shop Drawings: Include details of materials construction and finish. Include relationship with adjacent construction.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum of five (5) years documented experience.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum of two (2) years documented experience.
- C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

1.05 PRE-INSTALLATION CONFERENCE

A. Convene a conference approximately two (2) weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor or Construction Manager and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the jobsite in original, unopened containers with labels intact.
- B. Store only under conditions recommended by the manufacturers.
- C. Remove and dispose of material that has exceeded the shelf life recommended by its manufacturer.

1.07 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.08 WARRANTY

- A. Performance Requirements:
 - 1. The completed system shall form a positive barrier against passage of moisture into interior wall assemblies or behind fixtures and from exterior to interior building areas.
- B. Provide a written guarantee to maintain sealant/caulking in a watertight condition for a minimum period of 2 years.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General Purpose Building Sealant (window and door frames, plumbing fixtures, wet areas) (non-paintable):
 - 1. Silicone sealant meeting ASTM C920, Type S, Grade NS, Class 25, and Fed Spec. TT-S-001543:
 - a. Sonneborn Sonolastic Omniplus.
 - b. GE Silicones Construction 1200.
 - c. Dow-Corning 790.
 - d. Or approved equal.
- B. General Purpose Building Sealant (paintable):
 - 1. Latex sealant meeting ASTM C920, Type S, Grade NS, Class 25, and Fed Spec. TT-S-001543:
 - a. DAP Dynaflex 230.
 - b. Or approved equal.
 - 2. Silyl-terminated polyether sealant meeting ASTM C920, Type S, Grade NS, Class 25, and Fed Spec. TT-S-001543:
 - a. Sonneborn 150.
 - b. Or approved equal.
- C. Colors for each sealant shall be selected by the Architect from manufacturer's standard color range.
- D. Primers shall be non-staining and specifically recommended for the type of installation by their manufacturer.
- E. Backup materials shall be non-absorbent and non-staining, closed cell, and specifically recommended for the type of installation by their manufacturer.
- F. Bond prevention materials shall be recommended by the manufacturer for the sealant products used.
- G. Materials, not specifically described, but necessary to complete this work, shall be first quality.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Correct conditions detrimental to the proper completion of the work.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Thoroughly clean surface.
- B. Sandblast or wire brush treated surfaces, if required, to obtain a clean, smooth surface.
- C. Insert approved backup material in the joint cavity to the depth required.
- D. Surfaces shall be wiped clean and dry prior to application to insure proper adhesion.
- E. Where the possibility of joint filler staining adjacent areas or materials exists, mask joints prior to application.
- F. Do not remove masking tape before joints have been tooled, and initial cure of joint filler has taken place.
- G. Work stained due to failure of proper masking precautions will not be accepted.

3.03 INSTALLATION OR APPLICATION

- A. Installation of Backup Material:
 - 1. Compress the backup material 25% to 50%.
 - 2. Avoid lengthwise stretching of the material.
 - 3. Do not twist or braid backup stock.
- B. Priming:
 - 1. Apply the primer in strict compliance with the manufacturer's recommendations.
- C. Bond Breaker Installation:
 - 1. Install a bond breaker where recommended by the manufacturer of the sealant.
- D. Installation of Sealants:
 - 1. Comply with manufacturer's recommended width-to-height ratios.
 - 2. Apply sealant under pressure to completely fill joints.
 - 3. Completely mask joints where the appearance of sealant on adjacent surfaces would be objectionable.
 - 4. Install the sealant in conformance with the manufacturer's recommendations.
 - 5. Tool all joints to the profile shown, or as directed by Architect.
 - 6. Joints shall be left smooth, uniform, and free of voids or air bubbles.

3.04 PROTECTION OR ADJUSTMENTS

A. Protect the work and materials of all other trades.

3.05 CLEANING OR REPAIR

- A. Remove masking tape immediately after joints have been tooled and initial cure of joint filler has taken place.
- B. Clean adjacent surfaces.
- C. Use solvent or cleaning agent as recommended by the sealant manufacturer.

END OF SECTION 07 92 00

EXPANSION JOINT COVER ASSEMBLIES SECTION 07 95 13

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1
 - 2. Interior expansion joint assemblies:
 - a. Vertical wall assemblies.
 - b. Horizontal wall assemblies.
 - 3. Associated accessories and hardware
 - 4. Submittal preparation
 - 5. Clean up.

B. Related Sections:

- 1. Section 06 10 00: Rough Carpentry
- 2. Section 07 62 00: Sheet Metal Flashing and Trim
- 3. Section 07 92 00: Joint Sealants
- 4. Section 09 21 16: Gypsum Board Assemblies

1.02 DEFINITIONS

- A. Maximum Joint Width: Widest linear gap a joint system tolerates and in which its designed function without damaging its functional capabilities.
- B. Minimum Joint Width: Narrowest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.
- C. Movement Capability: Value obtained from the difference between widest and narrowest widths of a joint.
- D. Nominal Joint Width: The width of the linear opening specified in practice and in which the joint system is installed.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product Data:
 - 1. Submit copies of manufacturer's latest published literature for materials specified herein for approval and obtain approval before materials are fabricated and delivered to the site. Data to clearly indicate movement capability of cover assemblies and suitability of material used in exterior seals for UV exposure.

- C. Shop Drawings or Layout Drawings:
 - 1. Submit copies of shop drawings for work specified herein for approval and obtain approval prior to fabrication and shipment of materials to the jobsite.
 - a. Shop Drawings showing full extent of expansion joint cover assemblies; include large-scale details indicating profiles of each type of expansion joint cover assembly, splice joints between sections, joinery with other types, special end conditions, anchorage, fasteners, and relationship to adjoining work and finishes. Include description of materials and finishes and installation instructions.
- D. Samples:
 - 1. Samples of materials specified herein shall be submitted for approval, and approval obtained, before materials are delivered to the site. Samples shall include the following:
 - a. Samples for each type of metal finish indicated on metal of same thickness and alloy to be used in work. Where normal color and texture variations are to be expected, include 2 or more units in each set of samples showing limits of such variations.
 - b. Samples of each type of flexible seal to be used in work with color samples as above.
- E. Certificates: Material test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of fire-rated expansion joint assemblies with requirements indicated.

1.04 QUALITY ASSURANCE

- A. Materials and work shall conform to the latest edition of reference specifications specified herein and to all applicable codes and requirements of local authorities having jurisdiction.
- B. Manufacturer Qualifications: Company specializing in manufacturing/fabrication of the products specified in this Section with minimum five (5) years documented experience.
- C. Installer Qualifications: Company approved by the manufacturer and specializing in applying of the products specified in this Section with minimum three (3) years documented experience.
- D. Single-Source Responsibility:
 - 1. Obtain expansion joint cover assemblies from one source from a single manufacturer.

- E. Product Options: Drawings indicate size, profiles, and dimensional requirements of architectural joint systems and are based on the specific system(s) indicated.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to the Architect for review. See Section 01 60 00 "Product Requirements" for substitution procedures.
- F. Loading Characteristics: Standard loading refers to covers that can withstand up to 500 lb., point loads. Heavy duty refers to covers that can withstand up to 2000 lb. point loads.
- G. Fire-Test-Response Characteristics: Where indicated, provide architectural joint system and fire-barrier assemblies tested for fire resistance per UL 2079 and/or E1966 by testing and inspecting agency acceptable to authorities having jurisdiction. Fire rating of joint cover assemblies shall not be less than the rating of adjacent construction.

1.05 PROJECT CONDITIONS

- A. Coordinate installation of wall joint systems with adjacent roof and wall construction.
 - 1. Where necessary, check actual locations of walls and other construction to which work must fit, by accurate field measurements, before fabrication. Show recorded measurements on final shop drawings and coordinate fabrication schedule with construction progress to avoid delay of Work.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Exercise proper care in the handling of all work so as not to injure the finished surface and take proper precautions to protect the work from damage after it is in place.
- B. Deliver materials to the jobsite ready for use and fabricated in as large sections and assemblies as practical. Assemblies shall be identical to submitted and reviewed shop drawings, samples, and certificates.
- C. Store materials under cover in a dry and clean location off the ground. Remove materials that are damaged or otherwise not suitable for installation from the jobsite and replace them with acceptable materials at no additional cost.

1.07 WARRANTY

A. Manufacturer to provide five (5) year warranty for all joint cover assemblies.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Inpro Corporation; Muskego, WI 53150
 - 2. Balco, Inc.; Wichita, KS 67217.
 - 3. Construction Specialties (C-S Group); Lebanon, NJ 08833.
 - 4. Or Approved Equal.
- B. Basis of Design- manufacturer by Inpro subject to compliance with requirements listed. The expansion joint cover assemblies and related materials herein specified and indicated on the drawings.

2.02 MATERIALS

- A. Aluminum: Alloy types of 6061-T6, 6063-T6, 6005A, or 5052-H32 sheet goods
 - 1. Walls and Ceilings: Standard Class II Custom Color Powder Coated
 - 2. Color to match adjacent wall color.
- B. Stainless Steel: Alloy Type 304 for plates and strips.
 - 1. Brushed #4 surface finish standard
- C. Elastomeric Seals: Synthetic rubber seals comprised of a dual extrusion Santoprene rubber for heat welding of all transitions and seams for a monolithic, weathertight installation. EPDM and Neoprene substitutions are not allowed due to their lack of ability to meet this specific requirement.
 - 1. All Santoprene seals must be certified as low VOC as certified by UL Environmental GreenGuard Gold Certification
- D. Compression Seals: ASTM D2000; preformed rectangular elastomeric extrusions having internal baffle system and designed to function under compression.
- E. Accessories:
 - 1. Manufacturer's standard anchors, fasteners, set screws, spacers, flexible vapor seals, and filler materials, drain tubes, adhesive, and other accessories compatible with material in contact, as indicated or required for complete installations.

2.03 FABRICATION - GENERAL

- A. Provide expansion joint cover assemblies of design, basic profile, materials, and operation indicated. Select units comparable to those indicated or required to accommodate joint size, variations in adjacent surfaces, and structural movement. Furnish units in longest practicable lengths to minimize number of end joints. Provide hairline mitered corners where joint changes directions or abuts other materials. Include closure materials and transition pieces, tee-joints, corner, curbs, cross-connections, and other accessories as required to provide continuous joint cover assemblies.
 - 1. Nominal Joint Width: 6"
 - 2. Lateral Shear Movement Capability: 50% +/- of total nominal joint width

2.04 INTERIOR JOINT ASSEMBLIES

- A. Vertical Wall Assemblies:
 - 1. Flush, metal wall cover is designed for low-maintenance and tamper-resistant applications. The free-floating aluminum center plate spans the joint and slides between retainer assemblies to allow for required movement.
 - 2. Basis of Design: Inpro 811 Series
 - 3. Wall-to-wall assemblies: 811-A07-150
 - 4. Wall-to-corner assemblies: 811-A09-150
- B. Horizontal Wall Assemblies:
 - 1. Recessed all metal cover is designed for low-maintenance and tamperresistant applications. The free-floating aluminum center plate spans the joint and slides between frame assemblies to allow for required movement.
 - 2. Basis of Design: Inpro 811 Series
 - 3. Wall-to-Wall assemblies: 811-A07-150
- C. NOTE: ALL JOINT COVER TRANSITIONS TO VERTICAL WALL COVERS TO BE CLEARLY DETAILED AND SUPPLIED BY THE SAME JOINT COVER MANUFACTURER.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Make a thorough examination of all surfaces receiving the work of this Section and before starting the installation. Notify the Contractor or Construction Manager, in writing, of any defect that would affect the satisfactory completion of the work of this Section.
- B. Verify all required backing and blocking prior to enclosing framing.
- C. Coordinate sequencing of work with other affected trades.

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- D. Field verify dimensions prior to fabrication.
- E. Start of work shall be considered as acceptance of existing conditions.

3.02 PREPARATION

- A. Examine the Contract Drawings and Specifications in order to ensure the completeness of the work required under this Section.
- B. Verify all measurements and dimensions at the jobsite and cooperate in the coordination and scheduling of the work of this Section with the work of related trades, with particular attention given to the installation of items embedded in concrete and masonry so as not to delay job progress.
- C. Provide all templates, as required, to related trade for location of all support and anchorage items.

3.03 INSTALLATION OR APPLICATION

- A. In addition to the requirements of these specifications, comply with manufacturer's instructions and recommendations for all phases of work, including preparation of substrate, applying materials, and protection of installed units.
- B. Provide anchorage devices and fasteners where necessary for securing expansion joint cover assemblies to in-place construction. Provide fasteners of metal, type, and size to suit type of construction indicated and provide for secure attachment of expansion joint cover assemblies.
- C. Perform all cutting, drilling, and fitting required for installation of expansion joint covers. Install joint cover assemblies in true alignment and proper relationship to expansion joints and adjoining finished surfaces measured from established lines and levels.
- D. Allow adequate free movement for thermal expansion and contraction of metal to avoid buckling.
- E. Locate roof and soffit covers in continuous contact with adjacent surfaces. Securely attach in place with all required accessories.
- F. Locate anchors at intervals recommended by manufacturer, but not less than 3 inches from each end, and not more than 24 inches on centers.
- G. Maintain continuity of expansion joint cover assemblies with end joints held to a minimum, and metal members aligned mechanically using splice joints. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal to avoid buckling of frames.

- H. Installation of Seismic Seals:
 - 1. Install secondary seals in continuous lengths; vulcanize all field splice joints in secondary seal material to provide watertight joints using manufacturer's recommended procedures.
 - 2. Install primary flexible seal in standard lengths
 - 3. Seal transitions and butt joints in accordance with manufacturer's instructions.

3.04 CONDITION OF FINISHED WORK

- A. Do not remove strippable protective material until finish work in adjacent areas is complete. When protective material is removed, clean exposed metal surfaces to comply with manufacturer's instructions.
- B. Completed assemblies shall be clean, with no visible imperfections, distortions, or defects.

END OF SECTION 07 95 13

HOLLOW METAL DOORS AND FRAMES SECTION 08 11 13

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Hollow metal frames.
 - 3. Hollow metal doors.
 - 4. Fire-rated openings.
 - 5. Foam insulation sealing of metal frames.
 - 6. Rebar doweling and grouting of HM frames to slabs.
 - 7. Certification of installation of water-resistive barriers at associated openings.
 - 8. Submittal preparation.
 - 9. Clean up.

B. Related Sections:

- 1. Section 06 10 00 Rough Carpentry
- 2. Section 06 20 00 Finish Carpentry
- 3. Section 08 14 16 Wood Doors
- 4. Section 08 71 00 Door Hardware
- 5. Section 08 81 00 Glass and Glazing
- 6. Section 09 21 16 Gypsum Board Assemblies
- 7. Section 09 91 23 Interior Painting

1.02 REFERENCES

- A. American National Standards Institute (ANSI)
 - 1. ANSI/SDI 100, Recommended Specifications for Standard Steel Doors and Frames.
 - 2. ANSI/SDI 119, Performance Test Procedures for Steel Door Frames and Anchors.
 - 3. ANSI A151.1, Test Procedure and Acceptance Criteria for Physical Endurance, Steel Doors and Frames.
 - 4. ANSI A224.1, Test Procedure and Acceptance Criteria for Prime-Painted Steel.
- B. ASTM International (ASTM)
 - 1. ASTM A 525, Specification for Steel Sheet, Zinc-Coated.
 - 2. ASTM E152, Fire Tests of Door Assemblies
- C. National Fire Protection Association (NFPA)
 - 1. NFPA 80, Standard for Fire Doors and Windows.
 - 2. NFPA 101, Life Safety Code

- D. Steel Door Institute (SDI)
 - 1. SDI 107, Hardware on Steel Doors, Reinforcement Application.
- E. California Building Code (CBC) 1. Title 24
- F. Uniform Building Code (UBC)
 - 1. UBC 7-2, Fire Tests of Door Assemblies.
 - 2. UBC 7-4, Fire Tests of Window Assemblies.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Shop Drawings or Layout Drawings:
 - 1. Submit copies of shop drawings for review by Architect prior to fabrication.
 - a. Indicate door and frame elevations, sections, materials, gauges, finish, fabrication/erection details, and locations of hardware, including reference to hardware sets and vision lites and louvers.
 - b. Show cross-references to architectural drawings/details.
 - c. Provide manufacturer's product and technical data sheets.
- C. Certification of Compliance:
 - 1. Provide a letter of certification that all materials comply with these Specifications.
- D. Samples:
 - 1. Submit as requested by Architect. Samples shall be returned after review.
- E. Substitutions:
 - 1. Make substitution requests in accordance with Section 01 60 00 "Product Requirements".

1.04 QUALITY ASSURANCE

- A. Steel Door and Frame Supplier:
 - 1. Direct factory supplier who employs a Certified Door Consultant (CDC) or person with equivalent experience, available at reasonable times during course of Work, for consultation to Owner, Architect, and Contractor.
- B. Label Construction:
 - 1. A physical label or approved marking shall be affixed to the fire door or fire door frame at an authorized facility as evidence of compliance with procedures of the labeling agency.

- C. Sequencing and Scheduling:
 - 1. Deliver doors and frames to the jobsite in a timely manner so as not to delay the progress of other trades.
 - 2. Issue purchase orders to suppliers so as not to interfere with normal quoted delivery times.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 - 1. Coordinate delivery to the appropriate locations (shop or field) for installation.
- B. Storage of Doors:
 - Doors shall be stored in an upright position under cover. Place the units on at least 4" (101.6 mm) wood sills on floors in a manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters which create a humidity chamber and promote rusting. If the corrugated wrapper on the door becomes wet, or moisture appears, remove the wrapper immediately. Provide a 1/4" (6.35 mm) space between the doors to promote air circulation.
- C. Storage of Frames:
 - Frames shall be stored under cover on 4" (101.6 mm) wood sills on floors in a manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters, which create a humidity chamber and promote rusting. Assembled frames shall be stored in a vertical position, five units maximum in a stack. Provide a 1/4" (6.35 mm) space between frames to promote air circulation.
- D. Damage:
 - 1. Inspect delivered items for damage. Minor damage may be repaired, provided repaired items are equal to new Work and accepted by the Architect. Provide new items when directed. Comply with VOC regulations when repairing damage.

1.06 PROJECT CONDITIONS

- A. Environmental:
 - 1. Packaging and Disposal:
 - a. Package in biodegradable packs, paper or cardboard boxes. Dispose of non-biodegradable packs, plastic, Styrofoam, polystyrene, and polyurethane to a licensed or authorized collector for proper disposal. Comply with the applicable standards and laws for VOC.

1.07 WARRANTY

A. Steel doors and frames supplied with a one (1) year warranty against defects in materials and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Ceco Corp., Oakbrook, Illinois;
 - 2. Curries Co., Mason City, Iowa;
 - 3. Steelcraft Manufacturing Co., Cincinnati, Ohio;
 - 4. Or approved equal.

2.02 MATERIALS

- A. Steel Requirements:
 - 1. Doors and frames manufactured of commercial quality, stretcher-leveled flatness, cold rolled steel per ASTM A366 and A568 general requirements. Internal reinforcing may be manufactured of hot rolled, pickled, and oiled steel per ASTM A569.
- B. Coating Materials:
 - 1. Primer:
 - a. Manufacturer's standard rust inhibiting primer to ANSI A224.1.
- C. Doors:
 - 1. Construction:
 - a. 16-gauge cold rolled steel.
 - b. Exterior doors and louvers shall be galvanized.
 - 1) Minimum zinc coating of 0.60 oz. / square foot (A60) per ASTM A-653.
 - 2. Doors shall be flush with visible edge seams.
 - 3. Shall be provided with top caps with flush-steel top.
 - 4. Door Reinforcing:
 - a. Doors shall be mortised and adequately reinforced for all hardware per hardware manufacturer's recommendations.
 - 1) Drill and tap for mortised hardware.
 - b. Reinforced internally with a 12-gauge steel reinforcement for surface closers.
 - 5. Core Materials:
 - a. Non-Rated Doors:
 - 1) Kraft/Paper Honeycomb or Polystyrene at the discretion of the manufacturer.
 - a) Polyurethane and Vertical Steel Stiffeners will not be accepted.
 - b) Internal reinforcing, manufactured of hot rolled, pickled, and oiled steel per ASTM A569.
 - b. Fire-Labeled Doors with temperature rise rating:
 - 1) Mineral fiber core, temperature rating per code.
 - 6. Fire Labeled Doors:
 - a. Provide Underwriter's Laboratories factory-applied door labels when indicated on the drawings to be a part of a rated assembly.

- 7. Provide cutouts, trims, and/or stops for glazing where indicated on the Drawings.
 - a. Glazing for doors shall be provided per Section 08 81 00 Glass and Glazing.
 - 1) Exterior door: Exterior Door Glazing.
 - 2) Interior door: Tempered Polished Plate Glass
- 8. Astragals: Z Type
- D. Frames:
 - 1. Construction:
 - a. 14-gauge cold rolled steel.
 - b. Exterior frames shall be galvanized.
 - 1) Minimum zinc coating of 0.60 oz. / square foot (A60) per ASTM A-653.
 - 2. Corner Construction:
 - a. Weld full depth and face, grind smooth, and re-prime
 - 3. Provide temporary shipping spreaders to help protect frames from damage during transit and handling. Remove spreaders prior to setting frame.
- E. Door Glass Light Frames:
 - 1. Flush with door face, Lo Pro type, as manufactured by Anemostat, fabricated of 18-gauge steel.

2.03 FABRICATION

A. Doors and frames shall be fabricated by a single source under controlled factory conditions for uniform quality and appearance.

B. Doors:

- 1. Classification:
 - a. SDI:
 - 1) Grade Level: III
 - 2) Model: 2
 - 3) Gauge: 16
 - 4) Description: Extra Heavy Duty, Full Flusha) CYCLES: 1,000,000
- 2. Vertical Lock Edges:
 - a. Beveled 1/8 inch in 2 inches.
 - b. Manufacturer's standard interlocking and glued edge.
- 3. Top and Bottom Channels:
 - a. Not less than 16-gauge, flush or inverted.
 - b. Welded to the face sheets.
 - c. Flush steel top channel.

C. Frames:

- 1. Corner Construction:
 - a. Weld full depth and face, grind smooth, and re-prime.
- 2. Provide temporary shipping spreaders to help protect frames from damage during transit and handling. Remove spreaders prior to setting frame.
- D. Frame Anchors:
 - 1. Attachment to Masonry Construction:
 - a. Galvanized
 - b. Adjustable, flat, corrugated, or perforated T-shaped, with leg not less than 2 inches wide by 10 inches long, or wire type, not less than 3/16 inches in diameter.
 - 2. Attachment to Drywall Construction:
 - a. Steel or Wood Stud-type to accommodate frame jamb depth and face dimension on welded frame.
 - b. Weld anchors to frame.
 - 3. Provide one anchor for every 30 inches of jamb or fraction thereof.
 - 4. Floor Anchor:
 - a. Angle Clip Type:
 - 1) 16 gauge.
 - 2) Two fasteners per jamb.
 - 3) Weld to bottom of each jamb.
 - 4) Grouted rebar pins to concrete at base.
- E. Preparation for Hardware:
 - 1. Prepare frames to receive mortise-type hardware and hinges, locks, latches, or other hardware.
 - 2. Verify hardware requirements with Section 08 71 00 "Door Hardware".
 - 3. Reinforce per SDI 107.
 - 4. Lock and closer reinforcement shall be box-type.
 - 5. Door hinge reinforcement: 7 gauge or equivalent, manufacturer's standard.
 - 6. Punch strike jambs to receive three silencers; double-leaf frames to receive manufacturer's standard preparation.
 - 7. Hardware locations per "Recommended Locations for Builders' Hardware for Standard Steel Doors and Frames".
 - 8. Provide welded-in-place guards for all hardware cutouts in frame.

2.04 FINISH

- A. Doors shall be thoroughly cleaned, phosphatized, and receive one coat of bakedon primer. Primer shall meet the requirements of ANSI A 224.1.
- B. Frames shall receive one (1) shop coat of air-dried, light gray, zinc chromate, rustinhibitive primer before shipment.

- C. Hollow Metal Doors and Frames Paint Schedule:
 - 1. 1st Coat:
 - a. Galvanized.
 - 2. 2nd Coat:
 - a. Galvanize etching.
 - 3. 3rd Coat:
 - a. Acrylic Metal Primer
 - 1) Benjamin Moore, Corotech Bonding Primer V175
 - 2) Carboline, Galoseal WB Primer
 - 3) Sherwin Williams, Procryl Primer

When "Shop Primed", do not omit field applied primer prior to first coat

- 1) Benjamin Moore, Corotech Bonding Primer V175
- 2) Carboline, Galoseal WB
- 3) Devoe 4020PF
- 4) Onsite solvent cleaning per SSPC-SP 1 requirements.
- 4. 4th Coat:
 - a. Aliphatic Acrylic Polyurethane
 - 1) Benjamin Moore, Aliphatic Acrylic Polyurethane V500
 - 2) Carboline, Carbothane #133
 - 3) Devoe, Devthane 379H Aliphatic Urethane.
 - 4) Sherwin Williams, Acrolon 100
- 5. 5th Coat:
 - a. Aliphatic Acrylic Polyurethane Semi-Gloss
 - 1) Benjamin Moore, Aliphatic Acrylic Polyurethane V500
 - 2) Carboline, Carbothane #133
 - 3) Devoe, Devthane 379H Aliphatic Urethane.
 - 4) Sherwin Williams, Acrolon 100

PART 3 EXECUTION

3.01 SETTING FRAMES

- A. Verify all water-resistive barriers, flexible flashings, etc. are properly installed with proper watershed lapping prior to starting installation of frames.
- B. Set frames in accordance with SDI 105.
- C. Set welded frames in place prior to construction of adjacent partition work. Properly brace frame until permanent anchors are set.
- D. Install fire-rated frames in accordance with NFPA 80.

3.02 DOOR INSTALLATION

A. Clearances:

- 1. 1/8 inch between door and frame at head and jambs.
- 2. 1/8 inch at meeting edges of pairs.
- 3. 1/8 inch at transom panels, without transom bar.
- 4. 3/4 inch above finish floor at sills without threshold.
- 5. 1/4 inch at sill with threshold.

3.03 SEQUENCING AND SCHEDULING

- A. Deliver doors and frames to the jobsite in a timely manner so as not to delay progress of other trades.
- B. Issue purchase orders to suppliers so as not to interfere with normal quoted delivery times.

3.04 QUALITY CONTROL

- A. Exposed welds shall be ground smooth.
- B. Primer shall be applied after welding and grinding.

3.05 PROTECTION, ADJUSTMENT, AND CLEANING

- A. Protect work as necessary until completion and acceptance of building.
- B. Remove dirt and excess sealants, mortar, or glazing compounds from exposed surfaces.
- C. Adjust moving parts for smooth operation. Use shims as required.
- D. Fill dents, holes, etc. with metal filler and sand smooth and flush with adjacent surfaces. Paint to match adjacent surface.

3.06 CONDITION OF FINISHED WORK

- A. Heads and sills of the same height shall line up with each other.
- B. Doors and frames shall be set true and plumb.
- C. No sandpaper marks, hammer marks, or blemishes will be allowed.
- D. Space around doors shall be uniform on both sides and top.

END OF SECTION 08 11 13

WOOD DOORS SECTION 08 14 16

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Wood doors.
 - 3. Glass or glazing light openings in wood doors.
 - 4. Door louvers or associated hardware.
 - 5. Submittal preparation.
 - 6. Clean up.

B. Related Sections:

- 1. Section 06 20 00 Finish Carpentry
- 2. Section 08 11 13 Hollow Metal Doors and Frames
- 3. Section 08 71 00 Door Hardware
- 4. Section 09 91 23 Interior Painting

1.02 REFERENCES

- A. American National Standards Institute (ANSI)
 - 1. ANSI 208.1 for Structural Composite Wood Cores, Grade LD-2
- B. ASTM International (ASTM)1. ASTM E152 Methods of Fire Tests and Door Assemblies
- C. California Building Code (CBC)
 - 1. CBC Standard 7-2, Fire Tests of Door Assemblies
- D. Door Industry Standard IS 1-A as applicable by:
 - 1. National Wood Window and Door Association (NWWDA) or
 - 2. Window and Door Manufacturers Association (WDMA)
- E. Intertek Testing Services (ITS)
- F. National Fire Protection Association (NFPA)
 - 1. NFPA 252 Standard Methods for Fire Assemblies
 - 2. NFPA 80 Fire Doors and Windows
- G. North American Architectural Woodwork Standards (NAAWS/WI)
 - 1. North American Architectural Woodwork Standards Manual, U.S.; Current edition.
- H. Uniform Building Code (UBC)
 - 1. UBC Standard 7-2, Fire Tests of Door Assemblies
- I. Underwriters' Laboratory, Inc. (UL)
 - 1. UL 10 (b) Fire Tests for Door Assemblies Neutral Pressure
 - 2. UL 10 (c) Fire Tests for Door Assemblies Positive Pressure

1.03 SUBMITTALS

- A. Shop Drawings or Layout Drawings:
 - 1. Submit shop drawings and product data to the Architect for review prior to beginning fabrication.
 - a. Indicate door opening criteria, elevations and sections, materials, thickness, door swing, stile and rail dimensions, veneers, undercuts, storage, special beveling, blocking for hardware in mineral core doors, identify cutouts and erection details, locations of finish hardware by dimension and location/details of all openings and louvers.
 - b. Do not proceed with any fabrication until all details are reviewed.
- B. Samples:
 - 1. Construction Samples:
 - a. Submit one or more manufacturer's standard samples demonstrating veneer and door construction.
 - 2. Finish Samples:
 - a. A set of three (3) illustrating the range of color and grain of the specified door face.
- C. Fire-Rated Door Assemblies:
 - All labeled fire door assemblies to be of types which have been classified and listed in accordance with the latest edition of ANSI/NFPA 80 and tested in compliance with: NFPA-252, UL-10C, and UBC 7-2. A physical label to be permanently affixed to the fire door at an authorized facility. Furthermore, all 'B' and 'C' label fire doors are to have manufacturer's standard laminated stiles for improved screw-holding and split-resistance capabilities.

1.04 QUALITY ASSURANCE

- A. General:
 - Wood door supplier to be a qualified direct distributor of products to be furnished. In addition, the distributor is to have in their regular employment an AHC/CDC, or person of equivalent experience, who is to be made available at reasonable times to consult with the Architect, Contractor, and/or Owner regarding any matters affecting the wood doors in this project.
 - 2. When hanging doors, do not subject them to extremes of heat and/or humid conditions. Relative humidity shall not be less than 30% or more than 60%.

- B. Conformance:
 - 1. Obtain doors from a single manufacturer to ensure uniformity in quality of appearance and construction. All material supplied for this project to conform to NWWDA/WDMA IS 1-A for premium grade wood doors.
 - a. Installation shall meet the minimum standards set forth in North American Architectural Woodwork Standards (latest edition)
 - 2. Installation, clearances, and operations shall comply with CBC Section 11B-705.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Protect doors during transit, storage, and handling to help prevent damage, soiling, and deterioration.
- B. Comply with manufacturer's instructions and with "onsite-care" requirements of site NWWDA/WDMA IS 1-A section G-20 "Care and Installation at Jobsite."
- C. Deliver pre-finished components in manufacturer's original unopened protective covering or container, clearly marked with manufacturer's name, brand name, and identifying number on the covering.
- D. Do not walk or stack other materials on top of stacked doors. Do not drag doors across one another.
- E. For all doors not factory-finished seal all four edges (stiles and rails) immediately after delivery.

1.06 PROJECT CONDITIONS

- A. Project/Site Conditions:
 - 1. Deliver doors to jobsite only after "wet" construction operations are completed.
 - 2. Building shall be dry and have reached average prevailing relative humidity of locality.

1.07 WARRANTY

- A. Warranty:
 - 1. Wood Doors:
 - a. Submit written warranty on manufacturer's standard form signed by an official of the door manufacturer agreeing to repair or replace defective doors which have:
 - 1) Delamination to any degree.
 - 2) Warp or twist of 1/4 inch or more in any 3-foot 6 inch by 7 foot plane of door face.
 - 3) Telegraphing of stile, rail or core through face to cause surface variation in excess of 1/100 inch in any 3-inch span.
 - b. Warranty to be in effect for life of the original installation.

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- c. Warranty to include refinishing and reinstallation that may be required due to repair or replacement of defective doors.
- d. Warranty not to be in effect for any field-finished doors not having been sealed properly on all edges and faces.
- 2. Installation:
 - a. Contractor shall warranty door installation for a period of two (2) years.

PART 2 PRODUCTS

2.01 GENERAL

- A. Comply with NWWDA/WDMA IS1-A for premium grade wood doors, except to meet or exceed requirements herein specified.
- B. Completely factory-fit to required size ready for installation at project site; no onjobsite trimming permitted.
- C. Prepare in accordance with frame shop drawings and schedule, hardware schedule and templates.
- D. Thickness:
 - 1. 1-3/4 inches thick, unless indicated otherwise on door schedule.

2.02 MANUFACTURERS

- A. Wood Doors:
 - Marshfield-Algoma by Forte Opening Solutions, Inc.
 a. Aspiro[™] Series
 - 2. Doormerica Products by ABS Manufacturing; Sacramento, CA. a. American Series.
 - 3. Oregon Door; Winston, OR.
 - a. Architectural Series
 - 4. Or approved equal.
 - a. Specific products or materials manufactured by any of the listed manufacturers are "acceptable", (not approved) only if the specific product or material can evidence compliance with this Section.

2.03 MATERIALS

- A. Wood Door Faces:
 - 1. Manufacturer's Standard 2 or 3 ply faces, 5 & 7 ply construction.
 - 2. Utilize Premium 'A' grade veneer per NWWDA/WDMA Standards and ANSI/HPVA grading rules.
 - 3. Minimum 1/50-inch-thick veneer at 12 percent moisture content veneer.
 - 4. Veneer shall be plain sliced of natural White Birch.
 - a. Face Veneer Match shall be Book Match.
 - b. Face Veneer Balance shall be Center-Balanced match.
- B. Adhesives:
 - 1. Bond door faces to cores, stiles, and rails.
 - 2. Exterior doors use minimum Type I ANSI/NWWDA/WDMA IS1-A Series.
 - 3. Interior doors use minimum Type II ANSI/WDMA IS1-A Series.
- C. Non-Rated and 20-Minute-Rated Doors:
 - 1. Door Core:
 - a. Structural Composite Wood Core complying with the following:1) ANSI-A208-1, Grade 1-LD-2.
 - b. Bonded to outer stiles and rails.
 - 2. Vertical Stiles:
 - a. Matching hardwood outer stile edge, 1 1/8" inch minimum before trim.
 - b. Stile Backers to be of mill option hardwoods or Engineered Lumber meeting NWWDA/WDMA IS-1A standards, securely bonded to the meeting NWWDA/WDMA IS-1A standards, securely bonded to the outer hardwood stile edge.
 - c. Matching edge banding.
 - d. Overall stiles 1-3/8 inches minimum after trim.
 - 3. Rail Edges:
 - a. Overall stiles 1-3/8 inches minimum after trim.
 - b. 1-3/8 inches minimum after trim and standard undercut.
 - 4. Edge Construction:
 - a. Category A Concealed intumescent coating included in door construction where required.
- D. Labeled Fire Door, 45 Minute, 1 Hour (60 Minute), and 1-1/2 Hour (90 Minute) Rated Doors:
 - 1. Door Core:
 - a. Noncombustible mineral composite.
 - b. Containing no asbestos.
 - 2. Vertical Stiles:
 - a. Hardwood outer stile edge, matching the face veneer.
 - b. Minimum 1-1/8 inches thick.
 - c. Laminated for improved screw holding and split resistance.
 - d. Containing no asbestos.

- 3. Rail Edges:
 - a. Top rail 1-1/4 inches minimum.
 - b. Bottom rail 1-1/2 inches minimum.
 - c. Laminated top and bottom rails.
 - d. Containing no asbestos.
- 4. Edge Construction:
 - a. Category A Concealed intumescent included in door construction where required.
- 5. Ratings for fire doors as called for in door schedule.

2.04 ACCESSORIES OR HARDWARE

- A. Light Openings:
 - 1. Openings shall be factory cut.
 - a. Coordinate openings with hardware cutouts.
 - 2. Factory-supplied, through-bolted metal stop assemblies shall be used.
 - 3. Glazing stop assemblies shall be 18-gauge steel, complete with factory-applied primer finish.
 - a. Quality Standard:
 - 1) Visionlite #VLT by Air Louver Inc.
 - 2) Or equal.
 - 4. Glazing for doors shall be provided per Section 08 80 00 "Glass and Glazing".
 - a. Exterior door: Exterior Door Glazing.
 - b. Interior door: Tempered Polished Plate Glass.
 - c. Fire rated doors: Fire rating glazing.

2.05 FACTORY FINISHING

- A. Pre-finish all wood doors at factory.
 - 1. Pre-finish all wood doors to NWWDA/WDMA Premium Finishing Systems per NWWDA/WDMA Section G-17.
 - 2. Pre-finish system shall meet or exceed the performance characteristics of NWWDA/WDMA 'System 5'.
 - 3. Finish shall be water-based stain complying with EPA Title 5 guidelines for Volatile Organic Compound (VOC) emissions limitations.
 - a. Color shall be custom to match Architects selection.
 - 1) Door manufacturer shall submit samples that match selected stain color.
 - 4. Finish doors using three (3) coats of manufacturer's standard water-clear urethane complying with EPA Title 5 guidelines for Volatile Organic Compound (VOC) emissions limitations, cured immediately with ultraviolet light.
 - 5. Factory seal all doors on all six (6) sides using Manufacturer's Standard meeting these specifications.

2.06 FITTING AND PREPARATION FOR HARDWARE

- A. Fit and machine all wood doors at the factory.
- B. Machine doors in accordance with final approved hardware and frame schedule.
- C. Fire doors shall be machined in strict compliance of NFPA 80.
- D. Machine doors within industry tolerances. A plus or minus 1/32-inch will be allowed on all hardware locations. A plus 1/32-inch minus 1/64-inch tolerance will be allowed on lock front preparation cutouts.

PART 3 EXECUTION

3.01 PREPARTION

- A. Examine door frames and verify frames are of correct type and have been installed for proper hanging of corresponding doors.
 - 1. Do not install doors in frame openings that are not plumb or are out of tolerance for size or alignment.

3.02 INSTALLATION

- A. Install work in this Section in accordance with manufacturer's written instructions, and as specified in the North American Architectural Woodwork Standards.
 - 1. Provide a WI Certified Compliance Certificate for Installation at the completion of project installation.
- B. Install fire doors in accordance with NFPA-80.
- C. Install accurately in frame, within clearances specified. Install hardware in accordance with manufacturer's written instructions and associated templates.
- D. Do not field cut doors to opening sizes smaller than those for which doors were manufactured. Do not install door in frame set out of plumb or square.
- E. Install to operate freely, but not loosely, free from hinge-bound conditions, striking, or binding. Do not install in frames that would hinder operation of doors. Hang free from rattling when in latched position.
- F. Pilot holes to be drilled for screws attaching hinges, lock hardware, and all other devices to the stile or face of wood doors. Pilot holes shall not exceed 90% of the root diameter of the screw.
- G. Jobsite finishing to be completed on all six (6) sides of doors prior to installation of finish hardware.

3.03 ADJUSTING

- A. Adjust and check each door to ensure proper operating and function.
- B. Replace or re-hang doors which are hinge-bound and do not swing or operate freely. Replace or re-hang doors which are warped, twisted, or which are not in true planes.
- C. Replace pre-finished doors damaged during installation.

END OF SECTION 08 14 16

ACCESS DOORS AND FRAMES SECTION 08 31 13

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Exterior access doors.
 - 3. Interior access doors.
 - 4. Fire-rated access doors.
 - 5. Accessories and associated hardware.
 - 6. Submittal preparation.
 - 7. Clean up.

B. Related Sections:

- 1. Section 06 10 00 Rough Carpentry
- 2. Section 06 20 00 Finish Carpentry
- 3. Section 08 71 00 Door Hardware
- 4. Section 09 21 16 Gypsum Board Assemblies
- 5. Section 09 91 13 Exterior Painting
- 6. Section 09 91 23 Interior Painting

1.02 REFERENCES

- A. American National Standards Institute (ANSI)
 1. ANSI-UL 10B Standard for Fire Tests of Door Assemblies
- B. Underwriters Laboratories (UL)

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product or Material Data:
 - 1. Submit copies of the manufacturer's latest written installation instructions prior to beginning installation.
- C. Shop Drawings. Include details, construction, and finish. Include relationship with adjacent construction.

1.04 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Fire-rated doors shall bear a label from Underwriters Laboratory for Class B (1-1/2 hour) rating meeting CBC, IBCO, BOCA codes, and be CSFM recognized for up to two (2) hour rated walls.
 - 2. Fire doors requiring three (3) hour rating shall bear a label from Warnock Hersey as well as meeting CBC, IBCO, BOCA, and be CSFM-recognized.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum of five (5) years documented experience.
- C. Installer Qualifications: Company specializing in performing Work of this section with a minimum of two (2) years documented experience with projects of similar scope and complexity.
- D. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

1.05 PRE-INSTALLATION CONFERENCE

A. Convene a conference approximately two (2) weeks before scheduled commencement of the Work. Attendees shall include Architect Contractor or Construction Manager and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
- B. Protect from damage due to weather, excessive temperature, and construction operations.

1.07 WARRANTY

A. Manufacturer's standard limited warranty unless indicated otherwise.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufactures:
 - 1. J.L. Industries.
 - 2. Karp Associates, Inc.
 - 3. Larsens.
 - 4. Milcor.
 - 5. Or approved equal.

2.02 MATERIALS

- A. Doors shall be fabricated from 14-gauge minimum steel and shall be insulated with non-combustible filler.
 - 1. Stainless steel door (No. 4) brush satin finish.
- B. Door frames and flanges shall be 16-gauge minimum steel.
- C. Doors and door frames shall match.
- D. Weld, fill, and grind smooth joints.

2.03 ACCESS DOOR TYPES

- A. Exterior access wall/soffit doors:
 - 1. Insulated access door provides convenient access to anywhere that requires protection against air leakage and/or water penetration.
 - a. Refer to Drawings for opening dimensions.
 - b. Finish:
 - 1) Mill finish.
 - 2) Prime painted in factory for field-applied paint. Refer to Section 09 91 13 "Exterior Painting" for paint application.
 - c. Doors:
 - 1) Door thickness: 1-1/2".
 - 2) Swing: Out-swing.
 - 3) Continuous hinge.
 - 4) Latch: Standard, Flush mounted, interchangeable turn ring operator and key operator latch.
 - 5) Gasket: Extruded EPDM draft seal gasket.
 - d. Leakage Rating: 2.05 cu ft per minute, at a test pressure of 12.0 inches of water column.

- B. Interior access wall/ceiling doors:
 - 1. Access door provides convenient access to anywhere that requires access to plumbing or electrical equipment/devices.
 - a. Refer to Drawings for opening dimensions.
 - b. Finish:
 - 1) Mill finish.
 - 2) Prime painted in factory for field-applied paint. Refer to Section 09 91 23 "Interior Painting" for paint application.
 - c. Doors:
 - 1) Swing: Out-swing.
 - 2) Flush to frame.
 - 3) Continuous hinge.
 - 4) Latch: Standard, Flush mounted, interchangeable turn ring operator and key operator latch.
- C. Fire-rated access wall/soffit doors:
 - 1. Uninsulated access door with fire rating to match adjacent fire rated construction.
 - a. Refer to Drawings for opening dimensions.
 - b. Fire Rating: To comply with Underwriters Laboratories.
 - 1) Rating to match adjacent building construction.
 - c. Finish:
 - 1) Mill finish.
 - 2) Prime painted in factory for field-applied paint. Refer to Section 09 91 23 "Interior Painting" for paint application.
 - d. Doors:
 - 1) Flush to frame. Self-closing.
 - 2) Swing: Out-swing.
 - 3) Continuous hinge.
 - 4) Latch: Standard, Flush mounted, interchangeable turn ring operator and key operator latch.

2.04 ACCESSORIES OR HARDWARE

A. Mount door on 175-degree minimum swing hinges with removable pins.

2.05 KEYING OR SECURITY

- A. Doors in secure areas as Custodian rooms or Electrical equipment rooms shall have quarter-turn cam locks.
- B. All other access doors shall have cylinder lock. Key all access doors alike.

2.06 FINISH

- A. Doors shall receive a baked-on factory primer coat.
- B. Final finish shall be field applied as specified in Section 09 91 13 "Exterior Painting" or 09 91 23 "Interior Painting".

PART 3 EXECUTION

3.01 GENERAL

- A. Verify all required backing and blocking prior to enclosing framing.
- B. Verify sizes and locations of rough openings.
- C. Start of work shall be considered as acceptance of existing conditions.

3.02 INSTALLATION

- A. Install per the manufacturer's latest written recommendations.
- B. Install plumb, level, and true-to-line.
- C. Fasten rigidly into place.

3.03 CONDITION OF FINISHED WORK

A. Completed installation shall be clean, with no visible imperfections.

END OF SECTION 08 31 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS SECTION 08 41 13

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Aluminum storefront, related sections, aluminum column covers, and aluminum entrance doors.
 - 3. Furnishing, fabrication, delivery, and installation of materials for the work of this Section.
 - 4. Aluminum tubes, channels, plates, reinforcing, and fasteners for storefront work and entrance doors.
 - 5. Storefront sash, division and corner bars, sill and jamb trim, bulkheads, aluminum frame sections, and brake metal
 - 6. Finish hardware for entrance doors under this Section.
 - 7. Caulking in connection with this work.
 - 8. Preparation of submittals including shop drawings and structural calculations.
 - 9. Clean up.
- B. Related Sections:
 - 1. Section 03 31 00 Structural Concrete Work
 - 2. Section 07 92 00 Joint Sealants
 - 3. Section 08 71 00 Door Hardware
 - 4. Section 08 81 00 Glass and Glazing

1.02 REFERENCES

- A. American Architectural Manufacturers Association (AAMA)
 - 1. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum.
 - 2. AAMA 2603 Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
- B. American with Disabilities Act (ADA)
- C. ASTM International (ASTM)
 - 1. ASTM A276 Standard Specification for Stainless Steel Bars and Shapes.
 - 2. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 3. ASTM C1036 Standard Specification for Flat Glass.
 - 4. ASTM C1048 Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.

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- 5. ASTM C1172 Standard Specification for Laminated Architectural Flat Glass.
- 6. ASTM E84 Measurement Uncertainty and Statistical Process Control for the Steiner Tunnel.
- 7. ASTM E90 Standard Test Method for Laboratory measurement of Airborne Sound Transmission Loss of Building Partitions and elements.
- 8. ASTM E283 Test Method for Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors under Specific Pressure differences across the Specimen.
- 9. ASTM E330 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- 10. ASTM E331 Standard Test Method for Water Penetration of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- D. American National Standards Institute (ANSI)
 - 1. ANSI Z97.1 Safety Glazing Materials Úsed in Buildings- Safety Performance Specifications and Methods of Test.
- E. American Society of Civil Engineers (ASCE)
 - 1. ASCE.SEI 7 Minimum Design Loads and Associated Criteria for Building and Other Structures.
- F. International Code Council (ICC)
 - 1. ICC A117.1 Accessible and Usable Buildings and Facilities.
- G. Underwriters Laboratories (UL)
 - 1. UL 723 Test for Surface Buring Characteristics of Building Materials.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product specified.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Typical installation methods.
- C. Sustainable Design Submittal:
 - 1. Product Data: For Recycled content, indicating postconsumer and preconsumer recycled content and cost.
- D. Samples:
 - 1. Selection Sample: For each finish product specified, two (2) complete sets of color chips representing manufacturer's full range of available colors and patterns.

- 2. Verification: For each type of the following products:
 - a. Face-Panel Finish: Manufacturer's standard-size unit, but not less than 6 inches square.
 - b. Linear Trim: 12 inch long.
 - c. Glazing: Manufacturer's standard-size unit, but not less than 6 inches square.
- E. Shop Drawings or Layout Drawings:
 - 1. Submit copies of drawings of installation details for storefront and entrance units to Architect for approval.

1.04 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Minimum five (5) years of experience manufacturing similar products.
 - 2. Installer: Minimum two (2) years of experience installing similar products.

1.05 PRE-INSTALLATION MEETINGS

- A. Convene minimum two (2) weeks prior to starting work of this section. Attendees shall include Architect, Contractor or Construction Manager and trades involved.
 - 1. Establish a procedure to maintain optimum working conditions and to coordinate this work with related and/or adjacent work.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
- B. Handling: Handle materials to avoid damage.

1.07 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.08 SEQUENCING

A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.09 WARRANTY

- A. Manufacturer's Warranty: Submit for Owner's acceptance, manufacturer's standard warranty.
 - 1. Warranty Period: Two (2) years from the Date of Notice of Completion of the project provided however that in no event shall the Limited Warranty begin later than six (6) months from date of shipment by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Kawneer; Norcross, GA
 - 2. CRL/US Aluminum Corp.; Waxahachie, TX
 - 3. Oldcastle Building Envelope; Dallas, TX
 - 4. Or approved equal.

2.02 BASIS OF DESIGN

- A. Storefront and Components:
 - 1. Kawneer Company, Inc.
 - a. Kawneer Trifab VersaGlaze 450 (1/4" glazing).
 - 1) 1-3/4" x 4-1/2" nominal dimension
 - 2) Centered Glazed.
 - (a) Front, Back or Multi-Plane Glazed when indicated on Drawings.
- B. Aluminum Entrances:
 - 1. Kawneer Company, Inc.
 - a. Kawneer 500 Standard Entrances:
 - 1) Wide Stile;
 - 2) Bottom Rail: 10"
 - 3) Depth: 1-3/4"

2.03 MATERIALS

- A. Storefront and Components:
 - 1. Aluminum:
 - a. Material Standard: Extruded Aluminum, ASTM B 221; 6063-T5 alloy and temper.
 - b. Member Wall Thickness: Each framing member shall provide structural strength to meet specified performance requirements.
 - c. Tolerances: Reference to tolerances for wall thickness and other crosssectional dimensions of storefront members are nominal, and in compliance with AA Aluminum Standards and Data.

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- B. Entrances and Components:
 - 1. Aluminum:
 - a. Material Standard: ASTM B 221; 6063-T5 alloy and temper.
 - b. Major portions of the door members to be 0.125" nominal in thickness and glazing molding to be 0.05" thick.
 - c. Tolerances: Reference to tolerances for wall thickness and other crosssectional dimensions of entrance members are nominal, and in compliance with Aluminum Standards and Data, published by The Aluminum Association.
 - 2. Glazing gaskets shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.
 - 3. Provide adjustable glass jacks to help center the glass in the door opening.
- C. Brake metal shall be .050 thickness, 6063-T5 aluminum alloy, anodized to match storefront materials, unless noted otherwise.
- D. Glazing:
 - 1. Glazing for storefront and entrance doors shall be provided per Section 08 81 00 "Glass and Glazing".
 - a. Storefront: Double Pane Glazing.
 - b. Entrance doors: Exterior Door Glazing.

2.04 ACCESSORIES OR HARDWARE

- A. Storefront and Components:
 - 1. Fasteners: Where exposed, shall be Stainless Steel.
 - 2. Gaskets: Glazing gaskets shall be extruded EPDM rubber.
 - 3. Perimeter Anchors: Aluminum. When steel anchors. are used, provide insulation between steel material and aluminum material to prevent galvanic action.
- B. Entrances and Components:
 - 1. Fasteners: Where exposed, shall be aluminum, stainless steel, or plated steel.
 - 2. Perimeter Anchors: Aluminum. When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
 - 3. Entrance Hardware:
 - a. Furnish and install hardware per Section 08 71 00 "Door Hardware". The manufacturer's standard hardware shall be used as follows when not specified under Finish Hardware.
 - 1) Weather-stripping:
 - a) Meeting stiles on pairs of doors shall be equipped with an adjustable astragal utilizing wool pile with polymeric fin.
 - b) The door weathering on a single acting offset pivot or butt-hung door and frame (single or pairs) shall be comprised of a thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.

- 2) Sill Sweep Strips: EPDM blade gasket sweep strip in an aluminum extrusion applied to the interior exposed surface of the bottom rail with concealed fasteners.
- 3) Threshold: Extruded aluminum, one piece per door opening with ribbed surface.

2.05 FABRICATION

- A. Storefront System Fabrication:
 - 1. Fabricate components per manufacturer's installation instructions, and with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
 - 2. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
 - 3. Prepare components to receive anchor devices. Fabricate anchors.
 - 4. Arrange fasteners and attachments to conceal from view.
 - B. Entrance System Fabrication:
 - Door corner construction shall consist of mechanical clip fastening, SIGMA- deep penetration plug welds and 1-1/8" long fillet welds inside and outside of all four corners. Glazing stops shall be hook-in type with EPDM glazing gaskets reinforced with non-stretchable cord.
 - 2. Accurately fit and secure joints and corners. Make joints hairline in appearance.
 - 3. Prepare components with internal reinforcement for door hardware.
 - 4. Arrange fasteners and attachments to conceal from view.

2.06 FINISH

- A. Exposed aluminum shall be given an Architectural Class II clear anodized finish.
 - 1. Dark Bronze anodized finish, unless otherwise noted.
 - 2. Minimum coating thickness 0.0007".
 - B. Ferrous metal work shall be given a coat of Rust-Oleum #1386 gray primer.

PART 3 EXECUTION

4.01 EXAMINATION

- A. Verify all required backing and blocking prior to enclosing framing.
- B. Verify framing or surfaces are acceptable prior to installing finish materials.
 - 1. Preparatory work is complete.
 - 2. Subsurface is plumb, straight, and true.
 - 3. Surface is securely fastened to structure.
 - 4. Verify all water-resistive barriers, flexible flashings, etc. are properly installed with proper watershed lapping prior to starting installation of frames.

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ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

4.02 INSTALLATION OR APPLICATION

- A. Storefront System:
 - 1. Fabricate setting blocks and spacer shims from neoprene or treated hardwood.
 - a. Material used for blocks and spacers must be compatible with type of compounds and sealant used and shall not cause staining or discoloration of the sealant or the frame.
 - 2. Install storefront systems plumb, level, and true-to-line, without warp or rack of frames with manufacturer's prescribed tolerances and installation instructions. Provide support and anchor in place.
 - a. Installation shall be designed to allow for natural expansion and contraction of glass and to counteract shocks and vibrations.
 - b. Dissimilar Materials: Provide separation of aluminum materials from sources of corrosion or electrolytic action contact points.
 - c. Weathertight Construction: Install sill members and other members in a bed of sealant or with joint filler or gaskets, to provide weathertight construction. Coordinate installation with wall flashings and other components of construction.
 - 1) Refer to Section 07 92 00 "Joint Sealants" for installation requirements.
 - 2) Seal joints between metal and adjacent construction.
 - 3. Glass: Refer to Section 08 81 00 "Glass and Glazing".
 - a. Reference: ANSI Z97.1, CPSC 16 CFR 1201, and Glass Association of North America (GANA) Glazing Manual.
 - b. Clean the sealing surfaces at perimeter of glass and sealing surfaces.
 - 1) Use only approved solvents and cleaning agents recommended by the compound manufacturer.
 - c. Center glass in glazing rabbet to maintain recommended clearances at perimeter on all four sides.
- B. Entrance System:
 - 1. General: Install entrance system in accordance with manufacturer's instructions and AAMA storefront and entrance guide specifications manual.
 - a. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
 - b. Provide alignment attachments and shims to permanently fasten system to building structure.
 - c. Align assembly plumb and level, free of warp and twist. Maintain assembly dimensional tolerances aligning with adjacent work.
 - d. Set thresholds in bed of mastic and secure.
 - e. Adjusting: Adjust operating hardware for smooth operation.

4.03 QUALITY CONTROL

A. Tolerances:

1. Gaps around and between entrance doors shall not exceed 1/8 inch.

4.04 PROTECTION OR ADJUSTMENTS

- A. Protect installed product's finish surfaces from damage during construction. Protect aluminum storefront system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.
 - 1. Damaged or discolored work shall be replaced without additional cost to the Owner.

4.05 CLEANING OR REPAIR

- A. Final Clean Up:
 - Clean installed products in accordance with manufacturer's instructions.
 a. No abrasive or caustic agents shall be used.
 - 2. Repair cracks, scratches, and other defects.
 - 3. Remove construction debris from site and legally dispose of debris.

4.06 CONDITION OF FINISHED WORK

- A. Heads and sills of the same height shall line up with each other.
- B. No sandpaper marks, hammer marks, or blemishes will be allowed.
- C. Space around doors shall be uniform on both sides and top.
- D. Work shall be level, plumb, square, at proper elevations, and in alignment with other work.
- E. Corners of doors shall be accurately joined and fitted with a flush hairline joint.

END OF SECTION 08 41 13

DOOR HARDWARE 08 71 00

PART 1 GENERAL INFORMATION

1.01 SUMMARY

- A. INCLUSIONS
 - 1. Provisions set forth in Divisions 0 & 1;
 - 2. Door Hardware, including electric hardware.
 - 3. Storefront and entrance door hardware.
- B. Related Sections:
 - 1. Section 06 20 0 Finish Carpentry a. Finish Hardware Installation
 - 2. Section 07 90 0 0 Joint Sealants
 - a. Exterior Thresholds.

 - Section 08 11 13 Hollow Metal Doors and Frames
 Section 08 14 16 Flush Wood Doors.
 Section 08 41 00 Entrances and Storefronts.
 Section 16 10 00 Basic Electrical Materials and Methods
 - a. Electrical Power.
 - 16 72 40 Security Access Systems. 7. Section
- C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.
 - 1. Windows.
 - 2. Cabinets, including open wall shelving and locks.
 - 3. Signs, except where scheduled.
 - 4. Toilet accessories, including grab bars.
 - 5. Installation.
 - 6. Rough hardware.
 - 7. Access doors and panels, except cylinders where detailed.
 - 8. Corner Guards.
 - 9. Conduit, Junction boxes, and wiring.

1.02 REFERENCES:

- A. Use date of standard in effect as of Bid date.
- B. American National Standards Institute ANSI 156.18 Materials and Finishes.
- C. ADA Americans with Disabilities Act of 2010
- D. BHMA Builders Hardware Manufacturers Association
- E. DHI Door and Hardware Institute
- F. NFPA National Fire Protection Association
 - 1. NFPA 80 Fire Doors and Windows
 - NFPA 101 Life Safety Code
 - NFPA 105 Smoke and Draft Control Door Assemblies
 - 4. NFPA 252 Fire Tests of Door Assemblies
- G. UL Underwriters Laboratories
 - UL10C Fire Tests of Door Assemblies as amended to incorporate positive pressure testing.
 - 2. UL 305 Panic Hardware
- H. WHI Warnock Hersey Incorporated
- I. State of California Building Code
- J. Local applicable codes

- K. SDI Steel Door Institute
- L. WI Woodwork Institute
- M. AWI Architectural Woodwork Institute
- N. NAAMM National Association of Architectural Metal Manufacturers

1.03 SUBMITTALS & SUBSTITUTIONS

- A. SUBMITTALS: Submit copies of schedule per General Conditions. Organize vertically formatted schedule into "Hardware Sets" with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:
 - 1. Type, style, function, size, quantity and finish of hardware items.
 - 2. Use BHMA Finish codes per ANSI A156.18.
 - 3. Name, part number and manufacturer of each item.
 - 4. Fastenings and other pertinent information.
 - 5. Location of hardware set coordinated with floor plans and door schedule.
 - 6. Explanation of abbreviations, symbols, and codes contained in schedule.
 - 7. Mounting locations for hardware.
 - 8. Door and frame sizes, materials and degrees of swing.
 - 9. List of manufacturers used and their nearest representative with address and phone number.
 - 10. Catalog cuts.
 - 11. Manufacturer's technical data and installation instructions for electronic hardware.
- B. Bid and submit manufacturer's updated/improved item if scheduled item is discontinued.
- C. Make substitution requests in accordance with General Conditions. Include product data and indicate benefit to the Project. Furnish operating samples on request.
 - 1. Items listed with no substitute manufacturers have been requested by Owner to meet existing standard.
- D. Furnish as-built/as-installed schedule with closeout documents, including keying schedule, wiring/riser diagrams, manufacturers' installation, adjustment and maintenance information, and supplier's final inspection report.

1.04 QUALITY ASSURANCE:

- A. Qualifications:
 - 1. A recognized architectural door hardware supplier with warehousing facilities in the Project's vicinity that has a record of successful inservice performance for supplying door hardware that is similar in quantity, type, and quality to that specified for this Project, and who employs an experienced architectural hardware consultant who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.
 - a) Responsible for detailing, scheduling and ordering of finish hardware. Detailing implies that the submitted schedule of hardware is correct and complete for the intended function and performance of the openings.

- B. Hardware: New, free of defects, blemishes and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer.
- C. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.
- D. Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers' instructions.
 - 1. Where scheduled item is now obsolete, bid and furnish manufacturer's updated item at no additional cost to the project.

1.05 DELIVERY, STORAGE AND HANDLING:

- A. Delivery: coordinate delivery to appropriate locations (shop or field).
 - 1. Permanent keys and cores: secured delivery direct to Owner's representative.
- B. Acceptance at Site: Items individually packaged in manufacturers' original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers.
- C. Storage: Provide securely locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, dust, excessive heat and cold, etc.

1.06 PROJECT CONDITIONS:

A. Where exact types of hardware specified are not adaptable to finished shape or size of members requiring hardware, provide suitable types having as nearly as practical as the same operation and quality as type specified, subject to Architect's approval.

1.07 SEQUENCING AND COORDINATION:

- A. Coordinate with concrete.
- B. Reinforce walls for wall-mounted hardware, including wall stops and stainless steel guard rails.
- C. Coordinate finish floor materials and floor-mounted hardware.
- D. Conduit and raceways as needed for electrical, electronic and electropneumatic hardware items. Fire/life-safety system interfacing. Point-topoint wiring diagrams plus riser diagrams to related trades.
- E. Furnish manufacturer templates to door and frame fabricators.
 - 1. Ensure proper blocking in wood doors to support wood screws for panic hardware and door closers.
 - 2. Ensure proper reinforcement in metal doors and frames to support machine screws for panic hardware and door closers.
- F. Use hardware consultant to check Shop Drawings for doors and entrances to confirm that adequate provisions will be made for proper hardware installation.
 - 1. Confirm that wood door manufacturers furnish necessary UL10C compliant seal packages.

1.08 WARRANTY:

- A. Part of respective manufacturers' regular terms of sale. Provide manufacturers' written warranties:
 - 1. Locksets:

Ten years.

- 2. Exit Devices:
- 3. Closers:

- Ten years.
- Thirty years mechanical, two years electrical.
- 4. Other Hardware: Two years.

1.09 COMMISSIONING:

- A. Conduct these tests three weeks prior to request for certificate of substantial completion:
 - 1. Test door hardware operation with climate control system and stairwell pressurization system both at rest and while in full operation.
 - 2. Test electronic hardware systems for satisfactory operation.

1.10 **REGULATORY REQUIREMENTS**:

- A. Locate latching hardware between 34" to 44" above the finished floor, per California Building Code, Section 1010.2.3 and 11B-404.2.7.
- B. Handles, pull, latches, locks, other operating devices: readily openable without tight grasping, tight pinching, or twisting of the wrist to operate. California Building Code 1010.2.2 and 11B-309.4.
- C. Adjust doors to open with not more than 5.0 lbs pressure to open at exterior doors and 5.0 lbs at interior doors. As allowed per California Building Code, Section 11B-404.2.9, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15 lbs.
- D. Adjust door closer sweep periods so that from an open position of 90 degrees, the door will take at least 5 seconds to move to a point 12 degrees from the latch, measured to the landing side of the door, per California Building Code Section 11B-404.2.8.1.
- F. Smooth surfaces at bottom 10" of push sides of doors, facilitating pushopen with wheelchair footrests, per California Building Code Section 11B-404.2.10.
- G. Door opening clear width no less than 32", measured from face of frame stop, or edge of inactive leaf of pair of doors, to door face with door opened to 90 degrees. Hardware projection not a factor in clear width if located above 34" and the hardware projects no more than 4". California Building Code Section 11B-404.2.3, 11B-404.2.4, and 1010.1.1.
- H. Door opening height shall not be less than 80 inches. Doors closers and door stops shall be permitted to be 78 inches minimum above the floor. California Building Code Section 11B-404.2.3 and 1010.1.1.1.
- I. Thresholds: floor or landing no more than 1/2" below the top of the threshold of the doorway. Change in level between 1/4" and 1/2": beveled to slope no greater than 1:2 (50 percent slope). California Building Code Section 11B-404.2.5.
- J. Floor stops: Do not locate in path of travel. Locate no more than 4" from walls.
- K. Pairs of doors: limit swing of one leaf to 90 degrees to protect persons reading wall-mounted tactile signage.

L. New Buildings on a K-12 Public School campus shall be provided with locks which allow the doors to classrooms and any other room with an occupant load of five or more persons to be locked from the inside. Locks shall conform to the specification and requirements of Section 1010.1.11. Exceptions include doors that are normally locked from the outside, relocatable moved within the same campus, and reconstruction projects.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

A. Listed acceptable alternate manufacturers: submit for review products with equivalent function and features of scheduled products.

ITEM:	MANUFACTURER:	ACCEPTABLE SUB:
Hinges	(IVE) Ives	Bommer
Continuous Hinges	(IVE) Ives	Select
Key System	(SCH) Schlage	Owner's Standard
Locks	(SCH) Schlage	Owner's Standard
Closers	(LCN) LCN	Owner's Standard
Silencers	(IVE) Ives	Rockwood
Kickplates	(IVE) Ives	Rockwood
Stops & Holders –	(IVE) Ives	Rockwood
Thresholds	(ZER) Zero	NGP
Seals & Bottoms	(ZER) Zero	NGP

2.02 HINGING METHODS:

- A. Note: drawings typically depict doors at 90 degrees, doors will actually swing to maximum allowable. Use wide-throw conventional or continuous hinges as needed to allow door to stand parallel to wall for true 180-degree opening..
- degree opening.. B. Conventional Hinges: Steel or stainless steel pins and concealed bearings. Hinge open widths minimum, but of sufficient throw to permit maximum door swing.
 - 1. Three hinges per leaf to 7 foot, 6 inch height. Add one for each additional 30 inches in height or any fraction thereof.
 - 2. Extra heavy weight hinges on doors over 3 foot, 5 inches in width.
 - 3. Extra-heavy weight hinges on doors with panic hardware or fire exit devices.
 - 4. Outswinging exterior doors: non-ferrous with non-removable (NRP) pins.
 - 5. Non-ferrous material exteriors and at doors subject to corrosive atmospheric conditions.
 - 6. Provide shims and shimming instructions for proper door adjustment.
- C. Continuous Hinges:
 - 1. Geared-type aluminum at exteriors.
 - a. Heavy-duty, extra-bearing units for doors over 3 foot, 5 inches in width.
 - b. Heavy-duty, extra-bearing units for doors with panic hardware or fire exit devices.

c. Use wide-throw units where needed for maximum degree of swing, advise architect if commonly available hinges are insufficient.

2.03 LOCKSETS AND LATCHSETS:

- A. Mortise Locksets and Latchsets: as scheduled.
 - 1. Chassis: cold-rolled steel, handing field-changeable without disassembly.
 - 2. Latchbolts: 3/4 inch throw stainless steel anti-friction type.
 - 3. Lever Trim: through-bolted, accessible design, cast lever or solid extruded bar type levers as scheduled. Filled hollow tube design unacceptable.
 - a. Spindles: security design independent breakaway. Breakage of outside lever does not allow access to inside lever's hubworks to gain wrongful entry.
 - 4. Thumbturns: accessible design not requiring pinching or twisting motions to operate.
 - 5. Deadbolts: stainless steel 1-inch throw.
 - 6. Electric operation: Manufacturer-installed continuous duty solenoid.
 - 7. Strikes: 16 gage curved steel, bronze or brass with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing.
 - 8. Scheduled Lock Series and Design: Schlage L series, 06A design.
 - 9. Certifications:
 - a. ANSI A156.13, 1994, Grade 1 Operational, Grade 1 Security.b. ANSI/ASTM F476-84 Grade 31 UL Listed.
 - 10. Comply with CBC Section 11B-309.4.

2.04 CLOSERS

- A. Surface Closers:
 - 1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
 - 2. ISO 2000 certified. Units stamped with date-of-manufacture code.
 - 3. Independent lab-tested 10,000,000 cycles.
 - 4. Non-sized and adjustable. Place closers inside building, stairs and rooms.
 - 5. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
 - 6. Advanced Variable Backcheck (AVB): where scheduled, these units commence backcheck at approximately 45 degrees
 - 7. Opening pressure: Exterior doors 5 lb., interior doors 5 lb., the authority having jurisdiction may increase the opening force for fire-rated doors, not to exceed 15lbs max, per CBC 11B-404.2.9.
 - 8. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.
 - 9. Extra-duty arms (EDA) at exterior doors scheduled with parallel arm units. EDA arms: rigid main and forearm, reinforced elbow.
 - 10. Exterior door closers: tested to 100 hours of ASTM B117 salt spray test, furnish data on request.
 - 11. Exterior doors do not require seasonal adjustments in temperatures from 120 degrees F to –30 degrees F, furnish data on request.
 - 12. Non-flaming fluid, will not fuel door or floor covering fires.
 - 13. Pressure Relief Valves (PRV): unsafe, not permitted.

2.05 OTHER HARDWARE

- A. Kick Plates: Four beveled edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.
- B. Door Stops: Provide stops to protect walls, casework or other hardware.
 - 1. 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.
 - 2. Locate overhead stops for maximum possible opening. Consult with Owner for furniture locations. Minimum: 90deg stop / 95deg deadstop. Note degree of opening in submittal.
- C. Seals: Finished to match adjacent frame color. Resilient seal material: polypropylene, nylon brush, or solid high-grade neoprene. UL label applied to seals on rated doors. Substitute products: certify that the products equal or exceed specified material's thickness and durability. Proposed substitutions: submit for approval.
 - 1. Solid neoprene: MIL Spec. R6855-CL III, Grade 40.
 - 2. Non-corroding fasteners at in-swinging exterior doors.
- D. Thresholds: As scheduled and per details. Comply with CBC Section 11B-404.2.5. Substitute products: certify that the products equal or exceed specified material's thickness. Proposed substitutions: submit for approval.
 - 1. Exteriors: Seal perimeter to exclude water and vermin. Use Dow Corning 795 Silicone or approved equal. Non-ferrous 1/4inch fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors (SS/FHSL).
 - 2. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.
- E. Fasteners: Generally, exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL) may be slotted drive. Sheet metal and wood screws: full-thread. Sleeve nuts: full length to prevent door compression.
- F. Through-bolts: Do not use. Coordinate with wood doors; ensure provision of proper blocking to support wood screws for mounting panic hardware and door closers. Coordinate with metal doors and frames; ensure provision of proper reinforcement to support machine screws for mounting panic hardware and door closers.
- G. Silencers: Interior hollow metal frames, 3 for single doors, 4 for pairs of doors. Omit where adhesive mounted seal occurs. Leave no unfilled/uncovered pre-punched silencer holes.

2.06 FINISH:

- A. Generally BHMA 626 Satin Chromium.
 - 1. Areas using BHMA 626 to have push-plates, pulls and protection plates of BHMA 630, Satin Stainless Steel, unless otherwise noted.
- B. Door closers: factory powder coated to match other hardware, unless otherwise noted.
- C. Aluminum items: match predominant adjacent material. Seals to coordinate with frame color.

2.07 KEYING REQUIREMENTS:

- A. Key System: Schlage Primus utility-patented keyway, interchangeable core throughout. Key blanks available only from factory-direct sources, not available from after-market keyblank manufacturers. For estimate use factory GMK charge. Initiate and conduct meeting(s) with to determine system keyway(s), keybow styles, structure, degree of physical security and degree of geographic exclusivity. Furnish Owner's written approval of the system.
 - 1. Existing master key system.
 - 2. Primus Level (Verify)
 - 3. Construction keying: furnish temporary keyed-alike cores. Remove at substantial completion and install permanent cylinders/cores in Owner's presence. Demonstrate that construction key no longer operates.
 - 4. Temporary cylinders/cores remain Supplier's property.
 - 5. Furnish 10 construction keys.
 - 6. Furnish 2 construction control keys.
- B. Key Cylinders: furnish 6-pin solid brass construction.
- C. Cylinders/cores: keyed at factory of lock manufacturer where permanent records are maintained. Locksets and cylinders same manufacturer.
- D. Permanent keys: use secured shipment direct from point of origination to Owner.
 - 1. For estimate: 3 keys per change combination, 5 master keys per group, 5 grand-master keys, 3 control keys.
- E. Bitting List: use secured shipment direct from point of origination to Owner at completion.

PART 3 EXECUTION

3.01 ACCEPTABLE INSTALLERS:

A. Experienced craftsperson with a resume of successful projects. Can readily differentiate between number 2 and number 3 phillips-drive screws and screwdrivers. Can readily differentiate between #10-24 machine screws and drywall screws, and can explain correct usages of these items.

3.02 PREPARATION:

- A. Ensure that walls and frames are square and plumb before hardware installation.
- B. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.
 - 1. Notify Architect of any code conflicts before ordering material.
 - 2. Locate levers, key cylinders, t-turn pieces, touchbars and other operable portions of latching hardware between 34 inches to 44 inches above the finished floor, per CBC Section 11B-404.2.7.
- C. Overhead stops: before installing, determine proposed locations of furniture items, fixtures, and other items to be protected by the overhead stop's action.

3.03 INSTALLATION

- A. Install hardware per manufacturer's instructions and recommendations. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation. Remove and reinstall or replace work deemed defective by Architect.
 - 1. Gaskets: install jamb-applied gaskets before closers, overhead stops, rim strikes, etc; fasten hardware over and through these seals. Install sweeps across bottoms of doors before astragals, cope sweeps around bottom pivots, trim astragals to tops of sweeps.
 - 2. Use manufacturers' fasteners furnished with hardware items, or submit Request for Substitution with Architect.
 - 3. Replace fasteners damaged by power-driven tools.
- B. Locate floor stops no more than 4 inches from walls and not within paths of travel. See paragraph 2.2 regarding hinge widths, door should be well clear of point of wall reveal. Point of door contact no closer to the hinge edge than half the door width. Where situation is questionable or difficult, contact Architect for direction.
- C. Drill pilot holes for fasteners in wood doors and/or frames.
- D. Drawings typically depict doors at 90 degrees, doors will swing to maximum allowable. Install door closers to maximum allowable swing in conjunction with door stops.

3.04 ADJUSTING

- A. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.
 - 1. Hardware damaged by improper installation or adjustment methods to be repaired or replaced to Owner's satisfaction.
 - 2. Adjust doors to fully latch with no more than 1 pound of pressure.

3.05 **DEMONSTRATION**:

A. Demonstrate electronic hardware systems, including adjustment and maintenance procedures.

3.06 PROTECTION/CLEANING:

- A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.
- B. Clean adjacent wall, frame and door surfaces soiled from installation/reinstallation process.

3.07 SCHEDULE OF FINISH HARDWARE

- A. See door schedule in drawings for hardware set assignments.
- B. Miscellaneous Material:

1 EA OPTION BOARD SCE 900-4R 1 EA POWER SUPPLY PS906-4R SCE

HW SET: 01, 02, 09 & 10

Under separate contract.

HW SET: 03

2	ΕA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	ΕA	ELECTRIC HINGE	5BB1 4.5 X 4.5 TW8	652	IVE
1	ΕA	PRIMUS CORE ONLY	20-740	626	SCH
1	ΕA	EU STOREROOM LOCK	L9092TEU-RX 06A	626	SCH
1	ΕA	SURFACE CLOSER	4111.EDA	689	LCN
1	ΕA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	ΕA	WALL STOP	WS401/402CVX	626	IVE
3	ΕA	SILENCER	SR64	GRY	IVE
1	ΕA	POWER SUPPLY	PS902-4RL		SCE
1	ΕA	BUTTON MINI BOX	660-PB		SCE

DOORS NORMALLY CLOSED AND LOCKED. DOOR UNLOCKED BY PUSH BUTTON LOCATED AT RECEPTION DESK. FREE EGRESS AT ALL TIMES.

HW SET: 04

3	ΕA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	ΕA	STOREROOM LOCK	L9080T 06A	626	SCH
1	ΕA	PRIMUS CORE ONLY	20-740	626	SCH
1	ΕA	WALL STOP	WS401/402CVX	626	IVE
3	ΕA	SILENCER	SR64	GRY	IVE

HW SET: 05

ΕA	HINGE	5BB1 4.5 X 4.5	652	IVE
ΕA	OFFICE LOCK	L9050T 06A L583-363	626	SCH
ΕA	PRIMUS CORE ONLY	20-740	626	SCH
ΕA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
ΕA	WALL STOP	WS401/402CVX	626	IVE
ΕA	SILENCER	SR64	GRY	IVE
	EA EA EA EA EA	 EA HINGE EA OFFICE LOCK EA PRIMUS CORE ONLY EA KICK PLATE EA WALL STOP EA SILENCER 	EA HINGE 5BB1 4.5 X 4.5 EA OFFICE LOCK L9050T 06A L583-363 EA PRIMUS CORE ONLY 20-740 EA KICK PLATE 8400 10" X 2" LDW B-CS EA WALL STOP WS401/402CVX EA SILENCER SR64	EA HINGE 5BB1 4.5 X 4.5 652 EA OFFICE LOCK L9050T 06A L583-363 626 EA PRIMUS CORE ONLY 20-740 626 EA KICK PLATE 8400 10" X 2" LDW B-CS 630 EA WALL STOP WS401/402CVX 626 EA SILENCER SR64 GRY

HW SET: 06

2	ΕA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	ΕA	ELECTRIC HINGE	5BB1 4.5 X 4.5 TW8	652	IVE
1	ΕA	PRIMUS CORE ONLY	20-740	626	SCH
1	ΕA	EU STOREROOM LOCK	L9092TEU-RX 06A	626	SCH
1	ΕA	SURFACE CLOSER	4111.EDA	689	LCN
1	ΕA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	ΕA	WALL STOP	WS401/402CVX	626	IVE
1	SET	SEALS	188S HEAD AND JAMBS	BLK	ZER
1	ΕA	DOOR SWEEP	39A	AL	ZER
1	ΕA	THRESHOLD	545A MSLA-10	AL	ZER
1	ΕA	DOOR POSITION SWITCH	679-05HM		SCE

DOORS NORMALLY CLOSED AND LOCKED. DOOR UNLOCKED BY VALID CARD READER OR PROGRAMMED TIME UNLOCK. FREE EGRESS AT ALL TIMES.

HW SET: 07

3	ΕA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	ΕA	PRIVACY SET	L9040 06A L583-363 L283-722	626	SCH
1	ΕA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	ΕA	WALL STOP	WS401/402CVX	626	IVE
3	ΕA	SILENCER	SR64	GRY	IVE

HW SET: 08

3	ΕA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	ΕA	PRIVACY SET	L9040 06A L583-363 L283-722	626	SCH
1	ΕA	SURFACE CLOSER	4011	689	LCN
1	ΕA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	ΕA	MOP PLATE	8400 4" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS401/402CVX	626	IVE
3	ΕA	SILENCER	SR64	GRY	IVE

END OF SECTION 08 71 00

GLASS AND GLAZING SECTION 08 81 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Glass and glazing.
 - 3. Glass and glazing of wood and metal doors.
 - 4. All metal stop molds for fixed glass.
 - 5. Except in hollow metal doors.
 - 6. Caulking in connection with this work.
 - 7. Submittal preparation.
 - 8. Clean up.

B. Related Sections:

- 1. Section 06 10 00: Rough Carpentry
- 2. Section 08 11 13 Hollow Metal Doors and Frames
- 3. Section 08 14 16 Wood Doors
- 4. Section 08 41 13: Aluminum-Framed Entrances and Storefronts

1.02 REFERENCES

- A. ASTM International (ASTM)
 - 1. ASTM C1036 Standard Specification for Flat Glass.
 - 2. ASTM C1048 Standard Specification for Heat Strength and Fully Tempered Flat Glass.
 - ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 4. ASTM E1300 Standard Practice for Determining Load Resistance of Glass in Buildings.
 - ASTM E1996 Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
- B. Consumer Product Safety Commission (CPSC)
 - 1. CPSC 16 CFR 1201 Safety Standard for Architectural Glazing Materials.
- C. National Fire Protection Association (NFPA)
 - 1. Standard for Fire Test for Window and Glass Block Assemblies.
- D. Underwriters Laboratories (UL)
 - 1. UL 9 Standard for Fire Test of Window Assemblies.
 - 2. UL 10C Standard for Positive Pressure Fire Tests of Door Assemblies.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product and Material Test Data:
 - 1. Submit copies of product and material test data of materials intended for use in this work to Architect for approval prior to beginning installation.
- C. Samples or Mockups:
 - 1. Upon request, submit one 4"x4" sample of materials intended for use in this work for approval by the Architect.
- D. Shop Drawings:
 - 1. Submit copies of shop drawings to the Architect for approval prior to beginning installation.
 - a. Include full-size installation details.
- E. Samples or Mockups:
 - 1. Upon request, submit one 4"x4" sample of materials intended for use in this work for approval by the Architect.
- F. Certificates:
 - 1. Submit three signed certificates to the Architect verifying that glass and glazing were installed per manufacturer's recommendations.

1.04 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Fire-rated glass shall comply with the requirements of the California Building Code (CBC) and Division of the State Architect (DSA) including, but not limited to, the following:

Note: Fire-rated glass specified is intended to meet or exceed CBC and/or DSA requirements:

- a. CBC Section 716.3.4 Fire Protection Rated Glazing:
 - 1) Fire window assemblies in rated walls shall be protected by fixed glazing listed and labeled or marked for fire protection rating complying.
- b. CBC Section 716.3.2.1 Fire Resistance Rated Glazing:
 - Glazing materials in fire resistant rated wall assemblies shall be qualified by tests in accordance with ASTM E119 or UL 263, and they shall be labeled for the required fire protection rating and installed in accordance with their listing. Glazing in fire door assemblies and in fire window assemblies subject to human impact in hazardous locations shall comply with Section 2406.2(1).

- c. CBC Section 2406.1 Human Impact Loads:
 - 1) Individual glazed areas in hazardous locations, including glazing used in fire assemblies shall pass the test requirements of CPSC 16 CFR Part 1201, or CBC Table 2406.2(2).
- B. Conformance:
 - 1. Meet flatness requirements of ASTM C1048.
 - 2. Lock-strip gaskets shall conform to ASTM C542.
 - 3. Float glass shall meet ASTM C1036.
 - 4. Glass strength shall meet or exceed ASTM E1300.
 - 5. Tempered glazing shall have a visible manufacturer's etched identification quality mark on each pane per C.B.C. Section 2406.3.1.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store materials in accordance with the manufacturer's recommendations.
- B. Label each piece of glass.
 - 1. Indicate name of the manufacturer and the grade.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Non-Rated Glass:
 - 1. Clear, tinted, reflective, and obscured:
 - a. Vitro Architectural Glass; Carlisle, PA
 - b. Oldcastle.
 - c. Or approved equal.

2.02 MATERIALS

- A. Glass Type 'B'
 - 1. Interior Glazing including interior doors and windows:
 - a. Polished 1/4" Tempered Polished plate glass
 - 1) Tempered or non-tempered as indicated on Drawings.
 - 2) Conform to Fed. Spec. DD-G-451a.
 - 2. Decorative Window Film
 - 1) 3M Fasara; Milky White SH2MAML as indicated on Drawings.
 - 3. Perimeter Seal:
 - a. Butyl primary seal on each side of metal spacer with structural adhesive grade silicone secondary seal.
 - 1) Tempered or non-tempered as indicated on Drawings.

2.03 ACCESSORIES

- A. Glazing Compound:
 - 1. Glazing Tape:
 - a. Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by the manufacturer.
 - 2. Silicone Sealant:
 - a. One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable.
 - 3. Acceptable Products:
 - a. Dow Corning 795 Dow Corning Corp.
 - b. Siliglaze-II 2800 General Electric Co.
 - c. Spectrum 2 Tremco, Inc.
 - c. Setting Blocks:
 - Hardwood; thickness of glass by 4 inches by 3/16" thick or Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.
- B. Cleaners, Primers, and Sealers:
 - 1. Type recommended by manufacturer of glass and gaskets.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until the substrate have been properly constructed and prepared.
- B. If substrate preparation is the responsibility of another installer, notify the Contractor or Construction Manager in writing of unsatisfactory preparation before proceeding.
- C. Field verify required sizes.

3.02 PREPRATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best results for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, approved submittals and in proper relationship with adjacent construction.
- B. Install caulking according to the manufacturer's recommendations.
- C. Immediately remove any acid or cement-containing products which may come into contact with glass or glazing.

3.04 CONDITION OF FINISHED WORK

- A. Glass and glazing shall be free of blemishes, scratches, pits, or bubbles.
- B. Glazing beads shall be seated properly and tightly.
- C. Caulking shall be installed smoothly and uniformly.

3.05 CLEANING AND PROTECTION

- A. Glass and glazing shall be clean, free of grease, dirt, and foreign materials, and shall be streak free.
- B. Touch-up, repair or replace damaged products before Notice of Completion.

END OF SECTION 08 81 00
COMMON WORK RESULTS FOR FLOORING PREPARATION SECTION 09 05 61

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preparation of interior concrete floor slabs regardless of age or elevation to receive the following types of adhered floor coverings:
 - 1. Carpet tile.
 - 2. Resilient tile and sheet.
- B. Preparation of all interior concrete floor slabs regardless of age or elevation scheduled to receive loose-laid floor coverings.
- C. Testing of concrete floor slabs for dew point, moisture, substrate surface absorption and alkalinity.
- D. Smoothing compound, leveling compound, and patching compound.
- E. Remedial moisture vapor emission control for concrete floor slabs.

1.02 RELATED SECTIONS

A. Division 09 - Adhered Flooring Sections.

1.03 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM C109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens).
 - 2. ASTM C472 Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete.
 - 3. ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
 - 4. ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
 - 5. ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
 - 6. ASTM F3191 Standard Practice for Field Determination of Substrate Water Absorption (Porosity) for Substrates to Receive Resilient Flooring.
 - 7. ASTM F3311 Standard Practice for Mat Bond Evaluation of Performance and Compatibility for Resilient Flooring System Components Prior to Installation.

1.04 SUBMITTALS

- A. Smoothing Compound, Leveling Compound, Patching Compound, Adhesive, and Floor Covering Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
 - 1. Manufacturer's required moisture limits and test methods.
 - a. No such moisture testing shall be required where moisture vapor reduction admixture was required as part of the concrete mix design.
 - 2. Manufacturer's required alkalinity limits and test methods.
 - 3. Manufacturer's required substrate surface absorption/porosity test methods.
 - 4. Manufacturer's required concrete surface profile.
 - 5. Manufacturer's required bond/compatibility test procedure.
- B. Testing Organization's Report:
 - 1. Description of areas tested; include floor plans and photographs if helpful.
 - 2. Summary of conditions encountered.
 - 3. Copies of moisture and alkalinity test reports.
 - 4. Copies of concrete substrate water absorption test report.
 - 5. Summary of concrete surface profiles encountered.
 - 6. Copies of specified test methods.
 - 7. Recommendations for remediation of unsatisfactory surfaces.
 - 8. Submit report to Contractor.
 - 9. Submit report not more than two business days after conclusion of testing.
- C. Adhesive Bond and Compatibility Test Report.
- D. Remedial Moisture Vapor Emission Control Materials Product Data: Manufacturer's published data on each product to be used for remediation.
 - 1. Manufacturer's qualification statement.
 - 2. Manufacturer's installation instructions.
- E. Specimen Warranty:
 - 1. Copy of warranty to be issued by moisture vapor emission control manufacturer.
 - Copies of smoothing compound, leveling compound, patching compound, adhesive, and floor covering manufacturers' standard warranty form in which manufacturer agrees to repair or replace components of installation that fail due to defects in materials, or due to a manufacturing defect within the specified warranty period.
 - a. Conditions such as deterioration or failure of substrate, excessive substrate moisture, hydrostatic pressure, vandalism, excessive wear, or abuse are not subject to this warranty.

- 3. Copy of installation organization's standard warranty in which the installation organization agrees to repair or replace components of installation that fail due to defects in quality of workmanship or professionalism.
 - a. Conditions such as lack of climate control after installation, improper maintenance or cleaning, abuse, movement or warping of the substrate, excessive substrate moisture, vandalism, alterations, and subfloor hydrostatic pressure are not subject to this warranty.

1.05 QUALITY ASSURANCE

- A. Coordinate scheduling of all cleaning to allow adequate slab drying prior to any testing or installation.
- B. Coordinate scheduling of all testing to allow adequate slab hydration and acclimatization prior to any testing or installation.
- C. Moisture and alkalinity testing shall be performed by an independent testing agency employed and paid by Contractor.
 - 1. At Contractor's option, tests may be performed by the Contractor.
- D. Testing Agency Qualifications: Testing agency experienced in the types of testing specified.
- E. Remedial Moisture Vapor Emission Control Installer Qualifications: Company specializing in performing work of the type specified in this section, trained by or employed by coating manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging; include installation instructions.
- C. Keep materials from freezing.

1.07 PROJECT CONDITIONS

- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F (18 degrees C) or more than 85 degrees F (29 degrees C).
- B. Maintain concrete substrate surface temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing and through the duration of testing, at not less than 65 degrees F (18 degrees C) or more than 85 degrees F (29 degrees C).

C. Maintain ambient relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing and through the duration of testing, at not less than 40 percent and not more than 60 percent.

1.08 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard limited warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer:
 - 1. Taylor, which is located at: 800 College Drive, Dalton, GA 30720; Toll Free: 800-868-4583; Web: www.tayloradhesives.com.
- B. Or approved equal

2.02 MATERIALS

- A. Smoothing Compound, Leveling Compound, Patching Compound: Supplied by others. Though not supplied by ISE Logik, compounds used must meet the following criteria.
 - 1. Cementitious moisture-, mildew-, and alkali-resistant.
 - 2. Latex or polyvinyl acetate additions are permitted; gypsum content is prohibited.
 - 3. Compressive Strength, ASTM C109 or ASTM C472: 3000 psi (20684 kPa), minimum, after 28 days.
 - 4. Compound suitable for substrate conditions, and compatible with adhesive and floor covering.
- B. Alternate Flooring Adhesive: Low-VOC adhesive suitable for the moisture and pH conditions present and compatible with floor covering.
 - 1. Basis of Design: Resolute; as manufactured by Taylor.
 - 2. Thickness: As required for application and in accordance with manufacturer's installation instructions.
 - 3. Provide resistance to up to 100 percent relative humidity per ASTM F2170 and 25 pounds moisture vapor transmission per ASTM F1869.
 - 4. Provide resistant to alkalinity level of pH 14.
- C. Moisture Vapor Emission Control: Single- or multi-layer coating intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity found, and suitable for adhesion of flooring without further treatment.
 - 1. Basis of Design: Sahara Unlimited Moisture Barrier with Enhance Surface Bond Promoter; as manufactured by Taylor.
 - 2. Thickness: As required for application and in accordance with manufacturer's installation instructions.

- 3. Provide resistance to up to 100 percent relative humidity per ASTM F2170 and 25 pounds moisture vapor transmission per ASTM F1869.
- 4. Provide resistant to alkalinity level of pH 14.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean substrate surface in accordance with ASTM F710.
 - 1. Substrate surface shall be free of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, parting compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.

3.02 MOISTURE VAPOR EMISSION TESTING

- A. For concrete floor slabs without moisture vapor reduction admixture, test in accordance with ASTM F1869 and as follows.
 - 1. Test where adhesive applied floor finishes are to be installed, and where indicated.
 - 2. Concrete substrate temperature shall be no less than 65 degrees F (18 degrees C) and no greater than 85 degrees F (29 degrees C) during the conduct of the tests.
 - 3. Only test when concrete substrate surface is at least 5 degrees F (2.8 degrees C) above dew point.
- B. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated.
- C. Report the information required by the test method.

3.03 INTERNAL RELATIVE HUMIDITY TESTING

- A. For concrete floor slabs without moisture vapor reduction admixture, test in accordance with ASTM F2170 and as follows.
 - 1. Test where adhesive applied floor finishes are to be installed, and where indicated.
 - 2. Concrete substrate temperature shall be no less than 65 degrees F (18 degrees C) and no greater than 85 degrees F (29 degrees C) during the conduct of the tests.
 - 3. Only test when concrete substrate surface is at least 5 degrees F (2.8 degrees C) above dew point.
- B. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated.
- C. Report the information required by the test method.

3.04 ALKALINITY TESTING

- A. Test in accordance with adhesive and flooring manufacturer's written instructions.
- B. In the event that test values exceed adhesive and floor covering manufacturer's limits, perform remediation as indicated.
- C. Report the information required by the test method.

3.05 SUBSTRATE SURFACE ABSORPTION (POROSITY) TESTING

- A. Test in accordance with ASTM F3191.
- B. Follow the appropriate installation instructions for the substrate surface porosity conditions. If the selected material is not compatible with the substrate surface profile, select a different material compatible with substrate surface porosity conditions and flooring material.
- C. Report the information required by the test method.

3.06 ADHESIVE BOND AND COMPATIBILITY TEST

- A. Comply with requirements and recommendations of floor covering manufacturer.
- B. In the absence of adhesive and flooring manufacturer's written instructions, test in accordance with ASTM F3311.
- C. Report the results of the adhesive bond and compatibility tests and note any concerns over adhesion.

3.07 CONCRETE PREPARATION

- A. Prepare concrete substrate surfaces in accordance with ASTM F710.
 - 1. See individual floor covering sections for additional requirements.
- B. Comply with requirements and recommendations of adhesive, floor covering, smoothing, leveling, patching, thin set, and mortar manufacturers.
 - 1. Concrete slabs containing moisture vapor reduction admixtures do not require moisture testing.
- C. Verify appropriate concrete surface profile is present for material to be installed.
- D. Unless otherwise indicated by product manufacturer, do not install any material unless the following conditions are present:
 - 1. Substrate surface is clean.
 - 2. Substrate surface is dry.

- Substrate temperature is not less than 65 degrees F (18 degrees C) and no greater than 85 degrees F (29 degrees C) during and after installation.
- 4. Substrate surface is at least 5 degrees F (2.8 degrees C) above dew point.
- 5. Issues with moisture and alkalinity have been addressed.
- E. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with smoothing, leveling, or patching compound.
- F. Do not fill expansion joints, isolation joints, or other moving joints.
 - 1. Unless otherwise indicated, honor all moving joints up through flooring material.

3.08 REMEDIATION

- A. Active Water Leaks or Continuing Moisture Migration to Surface of Slab:
 - 1. Correct this condition before doing any other remediation.
 - 2. Re-test after correction.
- B. Excessive Moisture Emission or Relative Humidity:
 - 1. If an adhesive that is warranted to 100% relative humidity per ASTM F2170 is available and is compatible with flooring material, use that adhesive for installation of the flooring.
 - 2. If not, apply moisture vapor emission control over entire suspect floor area.
 - 3. Slabs containing moisture vapor reduction admixture require no further moisture vapor emission control remediation.
- C. Excessive Alkalinity, pH:
 - 1. If remedial floor coating is necessary to address excessive moisture, no additional remediation is required.
 - 2. If not, if an adhesive that is resistant to the level present is available and is compatible with flooring material, use that adhesive for installation of the flooring.
 - 3. Otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.09 CLEANING AND PROTECTION

A. Cover prepared floors with building paper or other durable covering.

END OF SECTION 09 05 61

GYPSUM BOARD ASSEMBLIES **SECTION 09 21 16**

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Gypsum drywall.
 - 3. Gypsum board substrates for vinyl wallcoverings, tackboards, vinyl-covered tackboards.
 - 4. Taping and accessories.
 - 5. Texture finish where indicated.
 - 6. Labor, materials, tools, and equipment.
 - 7. Submittal preparation.
 - 8. Clean up.

B. Related Sections:

- 1. Section 06 10 00: Rough Carpentry
- 2. Section 06 20 00: Finish Carpentry
- Interior Painting 3. Section 09 91 23:
- 4. Section 26 05 00: **Basic Electrical Materials and Methods**

C. Performance Requirements:

- 1. Provide solid smooth surface when additional finish material is applied over gypsum drywall.
- 2. Installations shall meet the requirements for fire ratings where specified.

1.02 REFERENCES

- A. American National Standards Institute (ANSI)
 - ANSI A108 Interior Installation of Cementitious Backer Units.
- B. ASTM Internation A9ASTM)
 - 1. ASTM C475/C475M Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - 2. ASTM C840 Standard Specification for Application and Finishing of Gypsum Board.
 - ASTM C919 Standard Practice for Use of Sealants in Acoustical Applications.
 - 4. ASTM C1002 Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products of Matal Plaster Bases to Wood Studs or Steel Studs.
 - 5. ASTM C1178/C1178M Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.

- 6. ASTM C1325 Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units.
- 7. ASTM C1396/C1396M Standard Specification for Gypsum Board.
- 8. ASTM C1639/C1639M Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and 'fiber-reinforced Cement Panels.
- 9. ASTM C1658/C1658M Standard Specification for Glass Mat Gypsum Panels.
- 10. ASTM C1766 Standard Specification for Factory-Laminated Gypsum Panel.
- 11. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
- 12. ASTM E814 Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
- 13. ASTM G21 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- C. Gypsum Association (GA)
 - 1. GA-214: Recommended Levels of Gypsum Board Finish.
 - 2. GA-216: Application and Finishing of Gypsum Panel Products.

1.03 DEFINITIONS

- A. Levels of Finish General: The following levels of finish are applicable when finishing gypsum panel products as defined by the Gypsum Association.
 - 1. The levels of finish are established as a guide prior to final decoration.
 - 2. The minimum requirements and scope of use for each independent level of finish shall be as described.
 - 3. All gypsum panel products shall be applied and prepared in accordance with GA-216 Application and Finishing of Gypsum Panel Products.
 - 4. Special care should be taken to protect surfaces after decoration as any patching or touch-up of even minor damage after the final finish may be difficult to conceal for Levels 3, 4 and 5.
 - 5. Where fire resistance, smoke resistance, or sound control is required for systems using gypsum panel products, the system's required level of finish shall be accomplished, and applicable building codes shall be followed. Refer to GA-600 Fire Resistance and Sound Control Design Manual.
 - 6. Applications of the difference levels of finish are indicated at the end of this Section.
- B. Levels of Finish:
 - 1. LEVEL 0:
 - a. Typically specified in temporary construction or whenever the final decoration has not been determined.
 - b. No taping, finishing, or accessories required.

- 2. LEVEL 1:
 - a. Typically specified joint treatment in smoke barrier applications and areas not normally open to public view such as plenum areas above ceilings, attics, and other areas where the assembly would generally be concealed.
 - b. All joints and interior angles shall have tape embedded in joint compound.
 - c. Excess joint compound and tool marks are acceptable; fastener heads need not be covered.
 - d. Accessories are not required, unless specified in the project documents.
- 3. LEVEL 2:
 - a. Typically specified where gypsum panel products are used as a substrate for tile; may be used in garages, warehouse storage or other similar areas where surface appearance is not a concern.
 - b. 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.
 - c. If joint compound is applied over the body of the tape and smoothed at the time of embedment in Level 1, it shall satisfy the conditions of this level.
 - d. Fastener heads and accessories shall be covered with one (1) coat of joint compound.
 - e. Surface shall be free of excess joint compound.
 - f. Tool marks are acceptable.
- 4. LEVEL 3:
 - a. Typically specified in appearance areas that are to receive heavy- or medium-texture finishes (spray or hand applied) before final painting, or where heavy-duty/commercial grade wallcoverings are to be applied as the final decoration.
 - b. This is not the correct level of finish for smooth wall designs or applications where light textures, non-continuous textures, or lightweight wallcoverings are to be applied.
 - c. All joints and interior angles shall have tape embedded in joint compound and shall be immediately wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles.
 - d. One (1) separate coat of joint compound shall be applied over all joints and interior angles.
 - e. Fastener heads and accessories shall be covered with two (2) separate coats of joint compound.
 - f. The surface shall be smooth and free of tool marks.

- 5. LEVEL 4:
 - a. Typically specified in appearance areas where smooth wall designs are decorated with flat paints, light textures, non-continuous textures, or wallcoverings are to be applied.
 - b. Non-flat or dark/deep tone paints are not recommended; refer to Level 5.
 - c. In critical lighting areas, flat paints applied over light continuous textures may reduce joint photographing.
 - d. The weight, texture, and sheen level of wallcoverings applied over this level of finish should be carefully evaluated.
 - e. Joints and fasteners must be adequately concealed if the wallcovering used is of lightweight construction, contains limited pattern, has a sheen level other than flat, or any combination thereof.
 - f. Unbacked vinyl wallcoverings are not recommended over this level of finish.
 - g. All joints and interior angles shall have tape embedded in joint compound and shall be immediately wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles.
 - h. Two (2) separate coats of joint compound shall be applied over all flat joints and one (1) separate coat of joint compound shall be applied over interior angles.
 - i. Fastener heads and accessories shall be covered with three (3) separate coats of joint compound.
 - j. The surface shall be smooth and free of tool marks.
 - k. Where glass mat and/or fiber reinforced gypsum panels are installed, refer to the gypsum panel or finishing product manufacturers for specific finishing recommendations.
- 6. LEVEL 5:
 - a. Typically specified in appearance areas where smooth wall designs are decorated with non-flat paints (i.e. sheen/gloss) or other glossy decorative finishes, dark/deep tone paints are applied, or critical lighting conditions occur.
 - b. The design professional shall clearly indicate the areas that meet these criteria on the finish schedule and/ or plans and specify the mock-up procedure and construction details within the project documents.
 - c. This level of finish is the most effective method to provide a uniform surface and minimize the possibility of joint photographing and/or fasteners showing through the final decoration.
 - d. All joints and interior angles shall have tape embedded in joint compound and shall be immediately wiped with a joint knife leaving a thin consistent coating of joint compound over all joints and interior angles.

- e. Two (2) separate coats of joint compound shall be applied over all flat joints and one (1) separate coat of joint compound shall be applied over interior angles.
- f. Fastener heads and accessories shall be covered with three (3) separate coats of joint compound.
- g. A skim coat of joint compound or a material manufactured especially for this purpose shall be applied to the entire surface.
- h. The surface shall be smooth and free of tool marks. Where glass mat and/or fiber reinforced gypsum panels are installed, refer to the gypsum panel manufacturer for specific finishing recommendations.
- C. Critical (Severe) Lighting Areas. Examples include wall and ceiling areas that are illuminated or flooded with artificial and/or natural light. Strong oblique light from windows or surface-mounted light fixtures may exaggerate minor surface differences. Where critical lighting cannot be avoided, the effects can be minimized by skim coating the entire surface, decorating the surface with medium to heavy textures, or the use of draperies and blinds that soften shadows. In general, non-flat and dark/deep tone paints highlight minor surface differences, whereas textures conceal these minor differences.
- D. Dark Paints. Colors with deep or strong hues, and even flat paints, tend to magnify imperfections in the finished gypsum panel surface and increase the possibility of joint photographing. A skim coat over the gypsum panel surface will minimize these conditions. Natural and artificial lighting becomes critical for these surfaces.
- E. Environmental Control. The potential for finishing and decorating problems are minimized when temperature, humidity, and airflow remain constant and as close to occupancy environmental conditions as possible. A minimum temperature of 50°F (10°C) shall be maintained continuously for 48 hours prior to and throughout the finishing process until the project is completed/occupied. For excessively humid, hot, cold, and dry situations, refer to GA-236 Joint Treatment Under Extreme Weather Conditions.
- F. Inspection Criteria. The normal viewing position shall be at a minimum distance of five (5) feet (1.5 m) perpendicular from the surface. Blemishes should not be visible from a normal viewing distance with normal light. Inspection lighting conditions are described as those in place when the project is finished. This includes but is not limited to design lighting (e.g. wall washers, spots, and floods, etc.) and natural lighting. Consideration shall be given to window treatment and/or any other decorative finishes that could affect lighting and viewing.
- G. Manufacturer's Recommendations. Individual manufacturer's recommendations may vary from what is recommended herein, in which case, the manufacturer's recommendations should be followed. Primer. A material that is formulated to be applied over the entire prepared gypsum panel surface prior to decoration. The priming material must be suitable for the substrate and applied as recommended by the coating manufacturer and shall be included within the paint specification.

- H. Sanding. Joint compound applied over joints, fasteners, and accessories should be finished as smoothly as possible to minimize sanding. Do not sand compound flush to panel surface over joints, fasteners, and accessories. Select sandpaper, sanding film, and/or abrasive mesh with grit as fine as possible that still allows for an acceptable sanding performance. Care shall be taken to ensure that the gypsum panel surface is not scuffed or raised during the sanding process.
- 1. Skim Coating. Skim coating is a process intended to conceal minor surface differences and create a more uniform surface. The objective of skim coating is to achieve total coverage of the entire surface, which is typically accomplished by using a drywall broad knife to force the material into the surface pores and imperfections, then shearing the excess compound from the surface. There is no specific mil thickness that constitutes a proper skim coat. This process may also be accomplished with spray applied materials or specialty products formulated for that purpose. Skim coating will not approximate a plastered finish/surface. Once the skim coating material dries, treated joints, filled voids, and spotted fastener heads may be visible.
- J. Texturing. Texturing is the application of material to create a desired textured effect. Unless otherwise specified by the texture manufacturer, a priming material shall be applied over the finished gypsum panel surface prior to decorating. Textured surfaces must be dry before painting.

1.04 SUBMITTALS

- A. Product or Material Data:
 - 1. Submit product description data for all proposed products or materials for review and acceptance by Architect prior to start of work.

B. Samples:

- 1. Textured Finishes: Apply to gypsum board, 4-inch by 6-inch.
- 2. Trim Accessories: 12-inch length of trim.

1.05 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. CBC Chapter 25 "Gypsum Board, Gypsum Panel Products and Plaster".
- B. 2022 CBC Chapter 8 "Interior Finishes", Section 803 "Wall and Ceiling Finishes" and Table 803.13:
 - a. Finish of interior materials shall meet minimum Fire Classification (non-sprinklered spaces):
 - 1) Interior exit stairways, ramps and exit passages:
 - a) Class 'A' (flame spread index 0-25; smoke developed 0-450).
 - 2) Corridors and enclosure for exit access stairways and ramps:
 - a) Class A (flame spread index 0-25; smoke developed 0-450).

- 3) Rooms and enclosed spaces:
 - a) Class B (flame spread index 26-75; smoke developed 0-450).

1.06 DELVIERY, STORAGE AND HANDLING

A. Handling, storage, and installation of the materials in accordance with the manufacturer's latest written requirements.

1.07 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Maintain temperatures, relative humidity, and other environmental conditions within manufacturer's suggested limits.

1.08 WARRANTY

- A. Warranty:
 - 1. One (1) -Year per General Conditions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Gypsum Wallboard:
 - 1. US Gypsum Co.
 - 2. Gold Bond
 - 3. Georgia-Pacific
 - 4. Other approved equal.

B. Accessories:

- 1. Milcor
- 2. Superior
- 3. US Gypsum
- 4. Other approved equal.
- C. Texture Finish:
 - 1. US Gypsum
 - 2. Other approved equal.

2.02 MATERIALS

- A. Paper-Faced Gypsum Wall Board:
 - 1. Regular fire-resistive core wall board:
 - a. 5/8" Type "X" core conforming to ASTM C1396, unless noted otherwise.
 - b. Tapered edges.

- 2. High Impact wall board:
 - a. 5/8" Type "X" core conforming to ASTM C1629/C1629M, Level 3.
 - b. Tapered edges.
 - c. Located at the bottom 8'-0" of the gypsum board walls within room 118-White Fleet Vehicles
- 3. Water resistant wall board:
 - a. 5/8" Type "X" core conforming to ASTM C1325.
 - b. Tapered edges.
- 4. Interior cement board:
 - a. 5/8", weight 3.65 lbs/sq.ft. (minimum) conforming to ASTM C1325.
 - b. Round edges.

2.03 ACCESSORIES

- A. Typical Trim and Accessories:
 - 1. 90 deg. outside corner bead: No-Coat by Drywall Systems International
 - 2. 90 deg. inside corner bead: No-Coat by Drywall Systems International
 - 3. Control joint: Sheetrock Brand Dur-A-Bead Corner Bead
 - 4. Angle trim: No-Coat Ultraflex 450 by Drywall Systems International
 - 5. Channel trim: USG 700A
 - 6. Misc. trim: USG 200A, 200B, 401, 402 & 071B
- B. Screws:
 - 1. Designed for gypsum wallboard installation.
 - 2. Comply with ASTM C954-18, C1002-20 and CBC Table No. 2506.2.
- C. Nails:
 - 1. Annular ring-shank nails conforming to ASTM C514-04, F547-17, F1667-21 and CBC Table No. 2506.2.
- D. Staples:
 - 1. Flattened 16-gauge galvanized wire with 1-1/8" legs.
- E. Joint Tape:
 - 1. USG Beadex Brand Drywall Joint Tape.
- F. Joint Compounds:
 - 1. USG Sheetrock Brand Durabond Taping Joint compound.
 - 2. USG Sheetrock Brand Topping Joint Compound.
- G. Acoustical Sealant: ASTM C919.
- H. Firestopping: Refer to Section 07 84 00.
- I. Fasteners for Cement Board: ASTM C1002.

PART 3 EXECUTION

3.01 SEQUENCING AND SCHEDULING

A. Coordinate location and installation of blocking and nailers required for the work of this Section.

3.02 INSTALLATION

- A. Installation shall be in accordance with the manufacturer's latest written recommendations.
- B. Comply with California Building Code Sections 2504.1 and 2504.2 and Table 2508.1.
- C. Additional Requirements:
 - 1. All vertical joints shall be positioned over a structural member.
 - 2. Set screw or nail heads slightly for the cement, but do not break paper finish.
 - a. Top with smooth coat of joint compound.
 - 3. Set joints with USG Perf-a-Tape and joint compound.
 - a. During hot, dry conditions use USG Durabond Taping Joint Compound or equal.
 - b. Knock-down high areas and finish with a coat of topping compound.
 - c. Taping may be omitted when gypsum board is used as a backing for tackable wallboard on interior wall (non-building envelope), non-rated assemblies only.
 - 4. Use the largest sheet size possible to avoid excessive joints.
 - 5. Horizontal surfaces shall be installed using type S or W screws at 12" on center maximum, unless noted otherwise. Install long side of sheets perpendicular to studs or joist.
 - 6. Stagger all joints.
 - 7. Do not use "score and knockout" method to cut openings.
 - 8. Staples may only be used to secure trim accessories.
 - a Fasten at 6" on center.

3.03 TEXTURE FINISH

- A. Surface Preparation:
 - 1. All surfaces, including joint compound applications, filling or patching treatments shall be dry, clean, and sound.
 - 2. Remove any water-soluble materials from surface.
 - 3. Dull or roughen any glossy surfaces.
 - 4. Prime metal surfaces with a rust-inhibitive primer.
 - 5. Fill and seal any exposed wood surfaces.

- B. Application:
 - 1. Apply materials to blend uniformly and cover fully without starved spots or other evidence of thin application.
 - 2. Provide uniform texture without application patterns.
 - 3. Remove any texture droppings or overspray from wall, windows, and floor, leaving room clean for following trades.
 - 4. Remove any texture droppings or overspray from wall, windows, and floor leaving room clean for following trades.
- C. Texture Finish Schedule:
 - 1. Surface treatment and finish materials as required for the following textures:
 - a. Wall Texture (Refer to Gypsum Association # GA-214-2022):
 - Toilet Rooms, Janitors and Kitchens to receive paint finish:
 a) GA Level 5
 - 2) All Other Rooms to receive paint finish:
 - a) GA Level 4 with texture
 - i. Light knockdown.
 - b. Ceiling Texture:
 - 1) Toilet Rooms, Janitors, and Kitchens:
 - a) GA Level 5
 - b) Or approved equal.
 - 2) All Other Rooms:
 - a) GA Level 4
 - i. Light knockdown.
 - b) Or approved equal.

3.04 QUALITY CONTROL

- A. Inspections:
 - 1. Inspector of Record
 - 2. Architect of Record
- B. Coordination:
 - 1. Meet with subsequent contractors whose work will follow to assure acceptance of substrate finish.
 - a) No additional cost for substrate preparation will be accepted by owner.

3.05 CLEANING OR REPAIR

- A. Keep premises clean during the progress of the work.
- B. Thoroughly clean-up work and adjacent areas upon completion of the work.
 - 1. Sweep areas clean.
 - 2. Remove tools, excess materials, and debris from site.

END OF SECTION 09 26 00

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Fairfax School District		

CEMENTITIOUS BACKING BOARDS SECTION 09 28 13

PART 1 PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Cement backerboard.
 - 3. Accessories.
 - 4. Submittal Preparation.
 - 5. Clean-up.
- B. Related Sections:
 - 1. Section 05 41 00 Structural Metal Stud Framing
 - 2. Section 09 21 16 Gypsum Board Assemblies
 - 3. Section 09 22 16 Non-Structural Metal Stud Framing
 - 4. Section 09 30 00 Tiling

1.02 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI A108.11, American National Standard for Interior Installation of Cementitious Backer Units.
 - 2. ANSI A118.1, American National Standard for Dry-Set Portland Cement Mortar.
 - 3. ANSI A118.4, American National Standard Specifications for Latex-Portland Cement Mortar.
 - 4. ANSI A118.9, Test Methods and Specifications for Cementitious Backer Units.
 - 5. ANSI A136.1, American National Standard Specifications for Organic Adhesives for Installation of Ceramic Tile.
- B. ASTM International (ASTM)
 - 1. ASTM C 1473, Test Methods for Physical Testing of Gypsum Board Panel Products.
 - 2. ASTM C 1325, Specification for Fiber-Mat Reinforced Non-Asbestos Cement Interior Substrate Sheets.
 - 3. ASTM C 1002, Specification for Steel Drill screws for the Application of Gypsum Panel Products or Metal Plaster Bases.
 - 4. ASTM D 2394, Methods for Simulated Service Testing of Wood and Wood-Based Finish Flooring.
- C. California Building Code (CBC) 2022, Chapter 25 "Gypsum Board, Gypsum Panel Products and Plaster".

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product Data:
 - 1. Provide manufacturer's specifications and installation instructions for each product specified.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping:
 - 1. Have materials shipped in manufacturer's original packages showing manufacturer's name and product brand name.
 - 2. Storage and Protection:
 - a. Store materials inside and protected from damage by the elements. Protect ends, edges, and faces of cement boards from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Cement Boards
 - 1. Custom Building Products: "Wonderboard";
 - 2. National Gypsum Company: "PermaBase Cement Board".
 - 3. USG: "Durock Brand Cement Board with EdgeGuard",
 - 4. Or approved equal.

2.02 MATERIALS

- A. Cement Board:
 - 1. Backer Board:
 - a. Cementitious, water durable board.
 - b. Surfaced with fiberglass reinforcing mesh on front and back.
 - c. Long edges wrapped.
 - d. Complying with ANSI A118.9 and ASTM C 1325.
 - e. Size:
 - 1) Thickness: 1/2" or 5/8"
 - 2) Width: 2 ft. 8 in., 3 ft. or 4 ft.
 - 3) Length: 4 ft., 5 ft. or 8 ft.
 - 4) Edges: Tapered.
 - 5) Compressive Strength: Not less than 2250 psi when tested in accordance with ASTM D 2394.
 - 6) Water Absorption: Not greater than 8 percent when tested for 24 hours in accordance with ASTM C 473.
 - 2. Fasteners:

- a. Screws: Hi-Lo thread screws (No. 8) water head, corrosion-resistant, 1-1/4 in. or 1-5/8 in. long and complying with ASTM C 1002.
- 3. Joint Treatment:
 - a. Tape: Alkali-resistant fiberglass mesh tape intended for use with cement board.
- 4. Bonding Materials:
 - a. Mortar: Dry-set portland cement mortar in accordance with ANSI A118.1;
 - b. Mortar: Latex-portland cement mortar in accordance with ANSI A118.4;
 - c. Adhesive: Organic adhesive in accordance with ANSI A136.1, Type 1.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify framing or surfaces are acceptable prior to installing finish materials.
- B. Verify the subsurface is plumb, straight, and true.

3.02 INSTALLATION

- A. General:
 - 1. In accordance with reference standards ANSI Spec. A108-11 and manufacturer's recommendations.
- B. For flooring applications over a wood-based substrate, laminate cementitious backing board to subfloor using Type 1 organic adhesive or latex-modified thin-set mortar suitable for bonding cement board. Fasten to subfloor with specified fasteners. Space fasteners for wood framing 8 in. o.c. in both directions with perimeter fasteners at least 3/8 in. and less than 5/8 in. from ends and edges. Drive nails and screws so that bottoms of heads are flush with panel surface to ensure firm panel contact with subfloor. Do not overdrive fasteners. Prefill joints with tile-setting mortar or adhesive and then immediately embed mesh tape and level joints.
- C. For wall application, fasten cement board panels to framing with specified fasteners. Drive fasteners into field of panels first, working toward ends and edges. Hold panels in firm contact with framing while driving fasteners. Space fasteners maximum 8 in. o.c. for walls, 6 in. o.c. for ceilings, with perimeter fasteners at least 3/8 in. and less than 5/8 in. from ends and edges. Drive nails and screws so bottoms of heads are flush with panel surface to ensure firm panel contact with framing. Do not overdrive fasteners

END OF SECTION 09 28 00

ACOUSTICAL CEILINGS SECTION 09 51 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Suspended ceilings system.
 - 3. Lay-in Acoustical panels.
 - 4. Touch-up repairs.
 - 5. Labor, materials, tools, and equipment.
 - 6. Preparation of submittals.
 - 7. Clean up.

B. Related Sections:

- 1. Section 06 10 00 Rough Carpentry
- 2. Section 09 21 16 Gypsum Board Assemblies
- 3. Section 23 00 00 Heating, Ventilation and Air Conditioning
- 4. Section 26 51 19 LED Interior Lighting

1.02 REFERENCES

- A. ASTM International (ASTM)
 - 1. ASTM A580/A580M Standard Specification for Stainless Steel Wire.
 - 2. ASTM A641/A641M Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
 - 3. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - ASTM A11008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High Strength Low-Alloy with Improved Formability.
 - 5. ASTM B209/B209M Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 6. ASTM C423 Sound Absorption by Reverberation Room Method.
 - 7. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 8. ASTM C635/C635M Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
 - 9. ASTM C636/C636M Standard Specification for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
 - 10. ASTM C1338 Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.

- 11. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
- 12. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- 13. ASTM E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- 14. ASTM E119- Standard Test Method for Fire Tests of Building Construction and Materials.
- 15. ASTM E413 Classification for Rating Sound Insulation.
- 16. ASTM E580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint.
- 17. ASTM 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems.
- 18. ASTM E1264 Standard Classification for Acoustical Ceiling Products.
- 19. ASTM E1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
- 20. ASTM E1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
- B. National Fire Protection Association (NFPA)
 - 1. NFPA 286: Standard Method of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

1.03 SYSTEM DESCRIPTION

- A. Ceiling System Descriptions:
 - 1. System 1:
 - a. Metal ceiling grid system (24"x48") with lay-in acoustical panel.
 - 2. System 2:
 - b. Metal ceiling grid system (24"x24") with lay-in acoustical panel.

1.04 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product or Material Data:
 - 1. System 1 and 2:
 - a. Submit product description and test and installation data for all proposed products or materials for review and acceptance by Architect prior to start of work.
 - b. Metal ceiling grid system test must include the following for both main runners and cross runners:
 - 1) Axial tension strength.
 - 2) Ultimate compressive strength.
 - 3) Ultimate load capacity.
 - 4) Ultimate load capacity of splices, intersections, and joints.

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- 5) Ultimate capacity of all materials and connections must exceed 180 pounds.
- C. Samples: Submit selection and verification samples: 6 inch × 6 inch (152 × 152 mm) sample for each wood fiber ceiling unit required, showing full range of exposed texture to be expected in completed work.
- D. Certificates: Submit manufacturer's certificate that products meet or exceed specified requirements.
- E. Samples or Mockups:
 - 1. Submit a complete set of color selection samples of proposed materials for color selection by Architect prior to ordering materials.
- F. Extra Stock:
 - 1. Provide 2% of extra ceiling tiles

1.05 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Materials must meet the standard set by the State of California for environmental protection and hazardous material content.
 - a. Comply with ASTM C635-07 and Section 5.1 of ASTM E580-10a.
 - 2. Qualified ICC-ER/ESR reports of submitted systems.
- B. 2022 CBC Chapter 8 "Interior Finishes", Section 803 "Wall and Ceiling Finishes" and Table 803.13:
 - 1. Finish of interior materials shall meet minimum Fire Classification (non-sprinklered spaces):
 - a. Interior exit stairways, ramps and exit passages:
 - 1) Class 'A' (flame spread index 0-25; smoke developed 0-450).
 - b. Corridors and enclosure for exit access stairways and ramps:
 - 1) Class A (flame spread index 0-25; smoke developed 0-450).
 - c. Rooms and enclosed spaces:
 - 1) Class B (flame spread index 26-75; smoke developed 0-450).
- C. Qualifications:
 - 1. Manufacturer: the manufacturer shall have a minimum of three (3) years documented experience in molding soldi wood panel systems or laminating veneers to fire retardant substrate and shall have at least five (5) projects of the scope and quality required by this project.
 - a. The manufacturer shall have tested the lamination bond of the veneer to the substrate without showing signs of delamination, cracking, or blistering.
 - b. The manufacturer shall have complete installation drawings and instruction to ensure quality installation.

- 2. Installer: Minimum two (2) years documented experience installation project of similar size and complexity.
- D. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

1.06 PRE-INSTALLATION MEETING

A. Convene minimum two (2) weeks prior to starting work of this Section.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver material in the manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Provide labels indicating brand name, source of procurement, style, size, and thickness.
- C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
- D. Handling: Handle materials to avoid chipping edges or damaged units in any way.

1.08 PROJECT CONTITIONS

- A. Environmental Requirements:
 - 1. The contractor shall ensure that temperatures, relative humidity, and other environmental conditions for material storage, handling, and installation are maintained within the manufacturer's suggested limits.
 - 2. System 3:
 - a. Do not install ceiling panels until the building is closed in and HVAC system is operational.
 - 3. Locate materials onsite at least 24 hours before beginning installation to allow materials to reach temperature and moisture content equilibrium.
 - 4. Maintain the following conditions in areas where acoustical materials are to be installed 24 hours before, during, and after installation.
 - a. Relative Humidity: 65 75%.
 - b. Uniform Temperature: 55 70 degrees F.
 - c. Provide adequate lighting for proper installation of materials.
 - d. Provide adequate ventilation for proper installation of materials.
- B. Building shall be dry and have reached average prevailing relative humidity of locality.

C. Do not install interior ceilings until space is enclosed and weatherproof; wet work in place is completed and nominally dry; work above ceilings is complete; and ambient conditions of temperature and humidity are continuously maintained at values near those intended for final occupancy. Building areas to receive ceilings shall be free of dust and debris.

1.09 SEQUENCING

- A. Ensure that products of this Section are supplied to affected trades in time to prevent interruption of construction progress.
- B. Coordination of Work: Coordinate acoustical ceiling work with installers of elated work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems and sprinklers.

1.10 WARRANTY

- A. Warranty Period:
 - 1. Manufacturer's warranty that the materials furnished hereunder will be free of manufacturing defects for a period of one (1) year. The manufacturer's warranty may be conditioned with a statement that damage resulting from wet job conditions, faulty construction, plumbing, or ventilating systems is not covered by the warranty. The manufacturer's warranty is limited to replacement of defective material only, rather than installation of the same. Faulty installation shall be corrected by the installing Contractor. The warranty required herein is the sole remedy against the manufacturer and there are no other implied warranties. In any event, the manufacturer shall be liable for any incidents or consequential damages.

1.11 MAINTENANCE

- A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match product installed. Packaged with protective covering for storage and identified with appropriate labels.
 - 1. Acoustical Ceiling Units (acoustical panels, tiles and metal units): Furnish quality of full-size units equal to 5.0 percent of amount installed.
 - 2. Exposed Suspension System Components: Furnish quality of full-size of each exposed suspension component equal to 2.0 percent of amount installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Suspension System:
 - 1. Suprafine Systems, Armstrong World Industries, Lancaster, PA
 - 2. Chicago Metallic Ceiling Systems, Rockfon North America, Chicago, IL
 - 3. Donn Brand Acoustical System, United States Gypsum Company, Chicago, IL
 - 4. Substitutions must demonstrate structural equivalency and must be submitted as a no cost change order and must be approved by the Division of the State Architect, Structural Safety Section, and the Structural Engineer of Record.
- B. Acoustical Tiles and Panels:
 - 1. Commercial Ceilings, Armstrong World Industries, Lancaster, PA
 - 2. Acoustical System, United States Gypsum Company, Chicago, IL
 - 3. Or approved equal.

2.02 MATERIALS

- A. Suspension System:
 - 1. Comply with ASTM C635/C635M, and DSA IR 25-2 latest revision.
 - 2. Grid shall be:
 - 1) System 1 Armstrong Suprafine XL 9/16" Exposed Tee, 24" x 48" Grid, White.
 - 2) System 2 Armstrong Suprafine XL 9/16" Exposed Tee, 24" x 24" Grid, White
 - a. Heavy duty, main; Armstrong #7501HRC, cross; Armstrong #XL8520HRC.
 - b. Or approved equal.
 - 3. Wall attachment angles shall be 15/16" x 15/16":
 - a. Armstrong #7878
 - 4. Exposed surfaces shall have a white baked-on vinyl or enamel finish.
 - 5. Ceiling wire shall be Class 1 zinc coated (galvanized) carbon steel conforming to ASTM A 641-09a. Wire shall be #12 gage (0.106" diameter) with soft temper and minimum tensile strength = 70 ksi.
 - 6. Galvanized sheet steel (including that used for metal stud and track compression struts/post) shall conform to ASTM A 653-11, or other equivalent sheet steel listed in Section A2.1 of the North American Specification for the Design of Col-Formed Steel Structural Members, 2007, including supplement 2 dated 2010 (AISI S100-07/S2-10). Material 43 mil (18 gage) and lighter shall have minimum yield strength of 33 ksi. Material 54 mil (16 gage) and heavier shall have a minimum yield strength of 50 ksi.
 - Electrical metallic tube (EMT) shall be ANSI C80.3/UL 797 carbon steel with G90 galvanizing. EMT shall have a minimum yield strength of 30 ksi and minimum ultimate strength (Fu) of 48 ksi.

- B. Acoustical Panels (AC-1) with System 1:
 - 1. 24" x 48" x 1" thick, Square Tegular 9/16" lay-in fiber board panels
 - a. Flame spread rating of less than 25.
 - b. Smoke development of less than 450.
 - c. NRC: 0.85
 - d. CAC: 35
 - e. Pattern to match the following:
 - 1) Armstrong Calla
 - 2) USG Mars Acoustical Panels
 - 3) Or approved equal.
 - f. Color: White
- C. Acoustical Panels (AC-2) with System 2:
 - 1. 24" x 24" x 1", Square Tegular 9/16" lay-in fiber board panels
 - a. Flame spread rating of less than 25.
 - b. Smoke development of less than 450.
 - c. NRC: 0.85
 - d. CAC: 35
 - e. Pattern shall match the following:
 - 1) Armstrong Calla
 - 2) USG Mars Acoustical Panel
 - 3) Or approved equal.
 - f. Color: White

PART 3 EXECUTION

3.03 EXAMINATION

- A. Examine surfaces scheduled to receive suspended or directly attached acoustical units for unevenness, irregularities, and dampness that would affect quality and execution of work.
- B. Do not proceed with installation of the ceiling system until unacceptable conditions are corrected.

3.04 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

3.05 INSTALLATION OR APPLICATION

- A. Suspended T-Bar System:
 - 1. Installation shall be in accordance with the manufacturer's latest written recommendations, drawings, and details, except where superseded by DSA requirements and the drawings, see typical installation notes below.
 - 2. Layout shall be as indicated on the drawing if shown.
 - a. Main runners shall be on 4-foot centers.
 - b. Cross runners shall be on 2-foot centers, unless noted otherwise.
 - 3. Install in a level, symmetrical, even pattern, unless shown otherwise.
 - 4. Edge tiles shall be of uniform width, unless shown otherwise.
 - 5. Grid joints shall be tight and flush.
 - 6. Wall angles shall be secured firmly to the wall with a minimum 1 1/2" screw penetration into stud or blocking.
 - 7. Tiles shall be cut to fit neatly and snugly into "t" bar grid.
 - 8. Field tegularize all cut and edge tiles.
 - 9. See Typical Suspended Ceiling Notes below. Installation shall conform to DSA Interpretation of Regulations #IR 25-2.

3.06 TYPICAL SUSPENDED CEILING INSTALLATION NOTES

- A. The following notes will be acceptable in plans and specifications for ceiling systems whose total weight, including air conditioning grilles and light fixtures, does not exceed four (4) psf. Heavier systems and those supporting lateral loads from partitions, will require special design details.
- B. #12-gauge (min.) hanger wires shall be 0.106 inches in diameter conforming to ASTM A641. #12-gauge wire shall be soft annealed, galvanized steel wire with a class 1 coating.
- C. #12-gauge wire may be used for up to and including 4'-0" x 4'-0" grid spacing and shall be attached to main runners.
- D. Provide #12-gauge hanger wires at the ends of all main and cross runners within eight inches (8") of the support or within one-fourth (1/4) of the length of the end tee, whichever is least, for the perimeter of the ceiling area. Perimeter wires are not required when the length of the end tee is 8" or less.
- E. Provide trapeze or other supplementary support members at obstructions to typical hanger spacing. Provide additional hangers, struts, or braces as required at all ceiling breaks, soffits, or discontinuous areas. Hanger wires that are more than 1 (horizontal) in 6 (vertical) out of plumb are to have counter sloping wires.

- F. Ceiling grid members shall be attached to two (2) adjacent walls per ASCE 7-05, Section 13.5.6.2(b). Ceiling grid members shall be at least 3/4" clear of other walls. If walls run diagonally to ceiling grid system runners, one end of main and cross runners should be free, and a minimum of 3/4" clear of wall.
- G. The width of the perimeter supporting closure angle shall be a minimum of 2".
- H. At the perimeter of the ceiling area where main or cross runners are not connected to the adjacent wall, provide interconnection between the runners at the free end to prevent lateral spreading. A metal strut or a 16-gauge wire with a positive mechanical connection to the runner may be used. Where the perpendicular distance from the wall to the first parallel runner is 12" or less, this interlock is not required.
- I. Expansion joints shall be provided in the ceiling at intersections of corridors and at junctions of corridors with lobbies or similar areas.
- J. Seismic separation joints shall be placed in ceiling areas over 2500 sq. ft. to divide the ceiling into areas not exceeding 2500 sq. ft. Alternatively, structural analysis shall be performed to demonstrate compliance with ASCE 7-05, Section 13.5.6.2.2 (d).
- K. Provide lateral-force bracing assemblies consisting of a compression strut and four
 (4) #12 gauge splayed bracing wires oriented 90 degrees from each other per the drawings and at the following minimum spacing:
 - 1. Place bracing assemblies at a spacing not more than 12' by 12' on center.
 - 2. Provide bracing assemblies at locations not more than one half (1/2) the spacing given above, from each perimeter wall and at the edge of any change in elevation of the ceiling.
 - 3. The slope of these wires shall not exceed 45 degrees from the plane of the ceiling and shall be taut. Splices in bracing wires are not to be permitted without special AHJ approval.
 - 4. Compression struts shall have a maximum slenderness ratio (kL/R) of 200 and shall not be more than 1 (horizontal) and 6 (vertical) out of plumb.
- L. Suspended acoustical ceiling systems with a ceiling area of 144 square feet or less, and fire-rated suspended acoustical ceiling systems with a ceiling area of 96 square feet or less, surrounded by walls which connect directly to the structure above, do not require lateral-force bracing assemblies when attached to two adjacent walls. Penetrations through the ceiling for sprinkler heads and other similar devices that are not integrally tied to the ceiling system in the lateral direction, shall have a 2" oversized ring, sleeve, or adaptor through the ceiling tile to allow free movement of 1" in all horizontal directions. Alternatively, swing joints may be provided per ASCE 7-05, Section 13.5.6.2.2(e).

- M. Fasten #12 hanger wires with not less than three (3) tight turns. Fasten #10 or #12 bracing wires with four (4) tight turns. Make all tight turns within a distance of 1½" inches. Hanger or bracing wire anchors to the structure should be installed in such a manner that the direction of the wire aligns as closely as possible with the direction of the wire.
 - 1. Note: Wire turns made by machine where both strands have been deformed or bent in wrapping can waive the 1½" requirement, but the number of turns should be maintained, and be as tight as possible.
- N. Separate all ceiling hanging and bracing wires at least six inches (6") from all unbraced ducts, pipes, conduit, etc.
- O. When drilled-in concrete anchors or shot-in anchors are used in reinforced concrete for hanger wires, 1 out of 10 must be field tested for 200 lbs. in tension. When drilled-in concrete anchors are used for bracing wires, 1 out of 2 wire/ anchor assemblies must be field tested for 440 lbs. in tension in the direction of the wire. Shot-in anchors in concrete are not permitted for bracing wires.
 - 1. Note: drilled-in or shot-in anchors require special DSA approval when used in prestressed concrete.
- P. Attach all light fixtures and ceiling-mounted air terminals to the ceiling grid runners to resist a horizontal force equal to the weight of the fixtures. Screws or approved fasteners are required.
- Q. Flush or recessed light fixtures and air terminals, weighing less than 56 lbs., and mechanical terminals and services, weighing less than 20 lbs., may be supported directly on the runners of a heavy-duty grid system but, in addition, they must have a minimum of two 12-gauge slack safety wires attached to the fixture at diagonal corners and anchored to the structure above. All 4' x 4' light fixtures must have slack safety wires at each corner.
 - 1. All flush or recessed light fixtures and air terminals or services weighing 56 lbs. or more must be independently supported by not less than four (4) taut 12gauge wires each attached to the fixture and to the structure above, regardless of the type of ceiling grid system used.
 - 2. The four (4) taut #12-gauge wires, including their attachment to the structure above, must be capable of supporting four (4) times the weight of the unit.
 - 3. Support surface-mounted light fixtures by at least two positive devices which surround the ceiling runner, and which are each supported from the structure above by a #12-gauge wire. Spring clips or clamps that connect only to the runner are not acceptable.
 - a. Provide additional supports when light fixtures are 8'-0" or longer. Maximum spacing between supports shall not exceed 8'-0".

- R. Support pendant-mounted light fixtures directly from the structure above with hanger wires or cables passing through each pendant hanger and capable of supporting two (2) times the weight of the fixture. A bracing assembly per drawing details, and note 11 above, is required where the pendant hanger penetrates the ceiling. Special details are required to attach the pendant hanger to the bracing assembly to transmit horizontal forces.
 - 1. If the pendant-mounted light fixture is directly and independently braced below the ceiling, i.e. aircraft cables to the walls, then brace assembly is not required above the ceiling. See DSA publication IR 16-9 for additional requirements for pendant-mounted fixtures.
- S. Metal panel and panels weighing more than 1/2 #/sq. ft., other than mineral fiberboard, shall be positively attached to the ceiling suspension runners.
- T. Where gypsum board or other ceiling finishes are attached to the framing, see specific details on the drawings for the vertical hanger wire and lateral bracing wire support connections to the framing.

3.07 CLEANING OR REPAIR

- A. Keep premises clean during the progress of the work.
- B. Thoroughly clean-up work and adjacent areas upon completion of the work.
 - 1. Sweep areas clean.
 - 2. Remove tools, excess materials, and debris from site.
- C. Replace all tiles or accessories damaged or stained during this work.

END OF SECTION 09 51 00

RESILIENT FLOOR COVERING SECTION 09 65 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1;
 - 2. Preparation of slabs or sub-floors;
 - 3. Resilient sheet flooring, welded seam resilient sheet flooring and coved base;
 - 4. Rubber top set base
 - 5. Backing and trim for coved base;
 - 6. Adhesives, accessories, labor, materials, tools, and equipment;
 - 7. Preparation of submittals;
 - 8. Clean up.
- B. Related Sections:
 - 1. Section 06 20 00: Finish Carpentry
 - 2. Section 09 05 61 Common Work Results for Flooring Preparation
 - 3. Section 09 68 13: Carpet Tiles
 - 4. Section 09 91 23: Interior Painting

1.02 SUBMITTALS

- A. Product or Material Data:
 - 1. Submit product description and test data for all proposed products or materials for review and acceptance by Architect prior to start of work.
- B. Samples or Mockups:
 - 1. Submit one (1) complete set of color selection samples of proposed materials for color selection by Architect prior to ordering materials.
- C. Shop Drawings or Layout Drawings:
 - 1. Submit a diagram showing the layouts of all proposed flooring material seams or joints for review by the Architect prior to installing material.
- D. Closeout Documents:

1. Maintenance instructions.

1.03 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Static Coefficient of Friction:
 - a. Resilient flooring to have minimum coefficient of friction of at least 0.6.
 - Test shall be based on ASTM D2047 James Slip Test, Shoe Material Official Test Leather.

- 2. Flammability:
 - a. ASTM E648.
 - b. ASTM E662.
- 3. Material Fabrication:
 - a. Vinyl Composition Sheet:
 - 1) ASTM F1303, Type II, Grade 1, Class B backing.
- 4. Health:
 - a. ASTM D2859.
- B. Warranty:
 - 1. Contractor's 1-year per General Conditions.
 - 2. Manufacturer's Limited 15-year warranty on welded seam resilient sheet flooring.
- C. Environmental Requirements:
 - 1. Contractor shall ensure that temperatures, relative humidity, and other environmental conditions for material storage, handling, and installation are maintained within the manufacturer's suggested limits.
 - 2. Provide adequate lighting for proper installation of materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Resilient Homogeneous Sheet Vinyl
 - 1. Shaw Contract
 - 2. Tarkett
 - 3. Mohawk Group
 - 4. Or approved equal.
- B. Rubber Top Set Base:
 - 1. Tarkett, Johnsonite Baseworks; TS rubber wall base;
 - 2. BurkeBase molded rubber wall base;
 - 3. Roppe, TS extruded rubber cove base;
 - 4. Or approved equal.

2.02 MATERIALS

- A. Sheet Flooring Basis of Design:
 - 1. Manufacturer: Shaw Contract
 - 2. Construction: Homogenous Sheet
 - 3. Wear Layer Thickness: 0.079" (2 mm)
 - 4. Collection: Vitality
 - 5. Style: Vitality Tones #4375V
 - 6. Color: "Pep Up" #00111

- B. Rubber Top Set Base Basis of Design:
 - 1. Manufacturer: Tarkett
 - 2. Construction: Thermoset Rubber (Type TS)
 - 3. Collection: Johnsonite Baseworks
 - 4. Color: Peppercorn

2.03 ACCESSORIES AND HARDWARE

- A. Accessories and hardware shall be used as recommended by the manufacturer and as detailed to create a complete installation.
- B. Rubber Top Set Base:
 - 4" high 1/8" thick thermoset vulcanized rubber with molded outside corners.
 a. Use 6" high where indicated on Interior Finish Schedule.
 - 2. Conform to Fed. Spec. SS-W-40A.
 - 3. Plastic or vinyl base material will not be accepted.
- C. Adhesive:
 - 1. Conform to the flooring manufacturer's latest written recommendations.
- D. Floor Filler and Patch:
 - 1. Portland cement-based resin.
 - a. Gypsum-based materials will not be allowed.
 - b. Minimum compressive strength: 4000 psi per ASTM 349/157.
 - c. 4,000 psi per ASTM 349/157.
- E. Metal Trim:
 - 1. Conform to the flooring manufacturer's latest written recommendations. Trimedge. Chromedge, Futura, extruded white metal molding of shapes and designs indicated on the drawings and/or as herein specified.
- F. Cove Base Cap Trim:
 - 1. Futura Industries or approved equal
 - a. Extruded aluminum type CM 406 or CM 903 as applicable

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine slabs and sub-floors for acceptability for the flooring to be installed.
 - 1. Notify General Contractor or Construction Manager and Architect of any unacceptable conditions prior to installing flooring.
 - 2. Do not install flooring over unacceptable subsurface. Application of flooring indicates acceptance of the underlying slab or sub-floor. Contractor is responsible for replacement and/or guaranty of flooring installed over unacceptable slabs or sub-floors.

B. Perform Calcium Chloride and bonding tests on concrete slab as specified by flooring manufacturer to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring.

3.02 PREPARATION

- A. Vacuum or broom-clean surfaces to be covered immediately before the application of flooring. Make sub-floor free from dust, dirt, grease, and all foreign materials.
- B. Repair flaws or defects in slabs or substrate. Smooth concrete surfaces, removing rough areas, projections, ridges, bumps, and filling low spots, control, or construction joints, and other defects with Floor Filler as specified in this Section.
- C. Maintain a smooth surface.
- D. Welded Seam Resilient Sheet Flooring and Homogenous Sheet Vinyl:
 - 1. Saw cut concrete around floor drains and/or floor sinks as required for proper installation of gully angles at welded seam resilient sheet flooring. Heat weld gully angles to sheet flooring.

3.03 DELIVERY, STORAGE, AND HANDLING

A. Handling, storage, and installation of the materials covered under this Section of the specifications shall be performed in accordance with the manufacturer's latest written requirements.

3.04 SEQUENCING AND SCHEDULING

A. Sequence work to avoid potential damage from other trades, such as painting or overhead work.

3.05 INSTALLATION OR APPLICATION

- A. Installation shall be in accordance with the manufacturer's latest written recommendations.
 - 1. Resilient Sheet Flooring shall be coved 6" unless shown otherwise.
 - a. Install cap strip using contact adhesive and 3d stainless steel nails at 16" on center.
- B. Roll flooring into wet adhesive with a minimum 100# roller.
- C. Joints shall be straight, tight, and shall align with adjacent walls.
 - 1. Completely weld seams of welded seam resilient sheet flooring joints, including coved areas.

- D. Lay out flooring to minimize seams.
- E. Sheet Flooring:
 - 1. Install flooring in strict accordance with the latest edition of manufacturer's installation instructions.
 - 2. Install flooring wall to wall before the installation of floor-set cabinets, casework, furniture, equipment, movable partitions, etc. Extend flooring into toe spaces, door recesses, closets, and similar openings as shown on the drawings.
 - 3. If required, install flooring on pan-type floor access covers. Maintain continuity of color and pattern within pieces of flooring installed on these covers. Adhere flooring to the subfloor around covers and to covers.
 - 4. Scribe, cut, and fit or flash cove to permanent fixtures, columns, walls, partitions, pipes, outlets, and built-in furniture and cabinets.
 - 5. Adhere flooring to the sub-floor without cracks, voids, raising, and puckering at the seams. Use manufacturers recommended adhesive with resistance to high moisture content. Roll with a 100-pound roller in the field areas. Hand-roll flooring at the perimeter and the seams to assure adhesion. Refer to specific rolling instructions of the flooring manufacturer.
 - 6. Lay flooring to provide a minimum number of seams. Avoid cross seams, filler pieces, and strips. Match edges for color shading and pattern at the seams in compliance with the manufacturer's recommendations.
 - 7. Install flooring with adhesives, tools, and procedures in strict accordance with the manufacturer's written instructions. Observe the recommended adhesive trowel notching, open times, and working times.
 - 8. Prepare heat-welded seams with special routing tool supplied for this purpose and heat weld with vinyl welding rod in seams. Use methods and sequence of work in conformance with written instructions of the flooring manufacturer. Finish all seams flush and free from voids, recesses, and raised areas.
 - Provide integral flash cove wall base unless shown otherwise on the drawings, including cove fillet support strip and top edge cap trim. Construct flash cove base in accordance with the flooring manufacturer's instructions. Heat weld seams as specified for those on the floor.

3.06 QUALITY CONTROL

- A. Field Inspection:
 - 1. Project Inspector and/or Owner's Representative
 - 2. Architect of Record.

3.07 CLEANING OR REPAIR

- A. Keep premises clean during the progress of the work.
- B. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.
- C. Thoroughly clean up work and adjacent areas upon completion of the work.
 - 1. Sweep and vacuum areas clean.
 - 2. Remove tools, excess materials, and debris from site.

3.08 EXTRA STOCK

A. Contractor shall provide 1.5% of uncut extra stock of each product used per this specification. One 1 qt. can of flooring adhesive and One 1 qt. can of RTSB glue shall be given to District for future use. All cans shall be new and unopened.

END OF SECTION 09 65 00

CARPET TILES **SECTION 09 68 30**

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Preparation of slabs or substrate.
 - 3. Carpet tiles; Cushion back carpet tiles.
 - 4. Rubber topset base and trims.
 - 5. Entry mat carpet tiles.
 - 6. Adhesives, accessories, labor, materials, tools, and equipment.
 - 7. Preparation of submittals.
 - 8. Clean up.
- B. Related Sections:
 - **Common Work Results for Flooring Preparation**
 - 1. Section 09 05 61 Resilient Floor Covering

1.02 REFERENCES

- A. ASTM International (ASTM)
 - 1. ASTM C349 Standard Test Method for Compressive Strength of Hydraulic-Cement Mortars (Using Portions of Prisms Broken in Flexure).
 - 2. ASTM D2859 Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.
 - 3. ASTM E648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
 - 4. ASTM E662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
 - 5. ASTM E1907 Standard Guide to Methods of Evaluating Moisture Conditions of Concrete Floors to Receive Resilient Floor Coverings.
 - 6. ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- B. National Fire Protection Association (NFPA)
 - 1. NFPA 253: Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant heat Energy Source.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product or Material Data:
 - 1. Submit product description and test data for all proposed products or materials for review and acceptance by Architect prior to start of work.
 - 2. Submit manufacturer's installation data for all proposed products or materials for review and acceptance by Architect prior to start of work.
- C. Samples or Mockups:
 - 1. Submit a complete set of color selection samples of proposed materials for color selection by Architect prior to ordering materials.
- D. Shop Drawings or Layout Drawings:
 - 1. Submit a diagram showing the layouts of all proposed flooring material seams or joints for approval by the Architect prior to installing material.

1.04 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Flammability:
 - a. Carpet tiles shall have a minimum radiant flux limit of 0.45 watts/sq. cm for Class I carpets as tested per ASTM E 648.
 - b. Carpet tiles shall have a minimum radiant flux limit of 0.22 watts/sq. cm for Class II carpets as tested per ASTM E 648 and 2022 CBC Section 804.4.2.
 - c. NFPA 253 classifications (I or II).
 - d. Smoke density less than 450 per ASTM E-662.
 - e. Methenamine Tablet flammability test per ASTM D 2859.
 - 2. Carpet tiles shall comply with the requirements of the California Building Code (CBC) and the Division of the State Architect (DSA) Access Compliance Section.
 - a. Changes in levels between 1/4" to 1/2" shall be accomplished by means of a minimum 1:2 sloped transition per 2022 CBC figure 11B-303.3.
 - a. Maximum pile height of 1/2" per 2022 CBC 11B-302.2.
 - b. Carpet edge trim shall meet 2022 CBC 11B-302.2.
 - 3. 2022 CBC Chapter 8 "Interior Finishes", Section 804 "Interior Floor Finish":
 - a. Finish of interior materials shall meet minimum Fire Classification 'Class C' (flame spread index 76-200; smoke developed 0-450).
 - B. Qualifications:
 - 1. Manufacturer: A qualified manufacturer with a minimum of five (5) years documented experience of the manufacturer of the specified products.
 - 2. Installer: A qualified installer with a minimum of three (3) years documented experience for installation of the products specified and approved by the carpet manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Handling, storage, and installation of the materials covered under the Section of the specifications shall be performed in accordance with the manufacturer's latest written requirements.

1.06 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Contractor shall ensure that temperatures, relative humidity, and other environmental conditions for material storage, handling, and installation are maintained within the manufacturer's suggested limits.
 - 2. Provide calcium chloride test per ASTM E 1907 & F 1869 to ensure moisture vapor allowance is within manufacturers recommendations.
 - a. Three (3) tests required for the first 1000 sq. ft. and one additional test per each 1000 sq. ft. thereafter.
 - 3. Provide adequate lighting for proper installation of materials.

1.07 WARRANTY

- A. Warranty:
 - 1. 1-year per General Conditions
 - 2. Wear Warranty: manufacturers 10-year warranty.
 - 3. Texture Retention: manufacturers 10-year warranty.
 - 4. Edge Ravel: manufacturers 10-year warranty.
 - 5. Delamination and Zippering: manufacturers 10-year warranty.
 - 6. 25# Tuff Bind

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Carpet Tiles:
 - 1. Shaw Contract
 - 2. E.F. Contract
 - 3. Mohawk Group
 - 4. Interface
 - 5. Or approved equal.
 - a. Product meeting minimum standards listed below:

B. Rubber Top Set Base & Transitions:

- 1. Tarkett;
- 2. Burke;
- 3. Roppe;
- 4. Other approved equal.

2.02 MATERIALS

- A. Carpet Tiles:
 - 1. Carpet submitted for color/pattern selection shall meet every minimum standard for construction listed below. Any carpet failing to meet one of these minimum standards will be rejected.
 - 2. Carpet Tile "C-01":
 - a. Design Standard
 1) Shaw Contract New Path: Upbeat Tile #5T490, 18" x 36"
 - b. Construction:

1) Multi-Level Pattern Loop

- c. Fiber:
 - 1) Ecosolution Q100[™] Nylon
- d. Face Weight:
 - 1) 17 oz/yd² (576.4 g/m²)
- e. Min. Density: 6581 oz./yd² (0.243 g/cm³)
- f. Backing:
 - 1) Strataworx® Tile
- g. Color/Pattern:
 - 1) Delightful #90780
 - 2) Installation Pattern: Ashlar
- 3. Carpet Tile "C-02":
 - a. Design Standards:
 - 1) E.F. Contract Access Walk-Off | AX, 24"x24"
 - b. Construction:
 - 1) Textured Loop
 - c. Fiber:
 - 1) Encore® SD Ultima® (with recycled content)
 - d. Face Weight:
 - 1) 30 oz./sy (1017 g/m²)
 - e. Min. Density:
 - 1) 8000 oz./y³ (296.65 kg/m³)
 - f. Color/Pattern:
 - 1) AX903 "Channel"
 - 2) Installation Pattern: Monolithic

2.03 ACCESSORIES

- A. Adhesive:
 - 1. Conform to the flooring manufacturer's latest written recommendations.
- B. Carpet Edge:
 - 1. Rubber long transition strips, unless noted otherwise.
 - a. Comply with 2022 CBC Section 11B-303.
 - 2. Color to match RTSB: TB1 "Peppercorn"
 - 3. Tarkett Edge Guard #EG-XX-H or equal Location: [Office 105, Office 106]
 - 4. Tarkett Adaptor # CTA-XX-A or equal Location: [Storage 201 Top Stair Tread]
- C. Subfloor Filler and Patch Material:
 - 1. Portland cement-based resin.
 - a. No gypsum-based materials will be allowed.
 - b. Minimum compressive strength of 4,000 psi per ASTM C349.
 - Patching of wood or gypsum substrates:
 a. Ardex "TL Wood" or approved equal
- D. Rubber Top Set Base:
 - 1. Refer to specification Section 09 65 00 "Resilient Floor Covering"
 - 2. Conform to Federal Spec. SS-W-40A.
 - 3. Plastic or vinyl base material will not be accepted.

PART 3 EXECUTION

3.03 EXAMINATION

A. Examine substrate for acceptability for floor installation.
1. Beginning installation indicates acceptance of substrate condition.

3.04 PREPARATION

- A. Repair flaws or defects.
- B. Maintain a smooth surface.

3.05 SEQUENCING AND SCHEDULING

A. Sequence work to avoid potential damage from other trades, such as painting or overhead work.

3.06 INSTALLATION OR APPLICATION

A. Installation shall be in accordance with the manufacturer's latest written recommendations and meet the requirements of 2022 CBC Section 11B-302.2.

3.07 CLEANING OR REPAIR

- A. Keep premises clean during the progress of the work.
- B. Thoroughly clean- up work and adjacent areas upon completion of the work.
 - 1. Sweep and vacuum areas clean.
 - 2. Remove tools, excess materials, and debris from site.

3.08 EXTRA STOCK

A. The contractor shall provide 1.0% of uncut extra stock of each product used per this specification. Two 1-quart cans of carpet glue and one 1 quart can of RTSB glue shall be given to District for future use. All cans shall be new and unopened.

END OF SECTION 09 68 13

DECORATIVE FIBERGLASS REINFORCED WALL PANELS SECTION 09 77 20

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1
 - 2. Decorative fiberglass reinforced wall panels
 - 3. Adhesives
 - 4. Moldings and trim
 - 5. Submittal preparation
 - 6. Clean up.
- B. Related Sections:
 - 1. Section 06 10 00 Rough Carpentry
 - 2. Section 09 21 16 Gypsum Board Assemblies
 - 3. Section 09 65 00 Resilient Floor Covering

1.02 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM D 256 Izod Impact Strength (ft#/in).
 - 2. ASTM D 570 Water Absorption (%).
 - 3. ASTM D 638 Tensile Strengths (psi) & Tensile Modulus (psi).
 - 4. ASTM D 790 Flexural Strengths (psi) & Flexural Modulus (psi).
 - 5. ASTM D 2583 Barcol Hardness.
 - 6. ASTM D 5319 Standard Specifications for Glass-Reinforced Polyester Wall and Ceiling Panels.
 - 7. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product or Material Data:
 - 1. Submit product description and test data for all proposed products or materials for review and acceptance by Architect prior to start of work.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Submit manufacturer's installation data for all proposed products or materials for review and acceptance by Architect prior to start of work.

- C. Shop Drawings:
 - 1. Submit elevations of each wall showing location of paneling selection and trim members with respect to all discontinuities in the wall elevations.
- D. Samples or Mockups:
 - 1. Submit a complete set of color selection samples of proposed materials for color selection by Architect prior to ordering materials.
- E. Manufacturers Material Safety Data Sheets (MSDS) for adhesives, sealants, and other pertinent materials.

1.04 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. CBC Chapter 8 "Interior Finishes", Section 803 "Wall and Ceiling Finishes":
 - a. Finish of interior materials shall meet minimum Fire Classification (non-sprinklered spaces):
 - 1) Interior exit stairways, ramps and exit passages:
 - a) Class 'A' (flame spread index 0-25; smoke developed 0-450).
 - 2) Corridors and enclosure for exit access stairways and ramps:a) Class A (flame spread index 0-25; smoke developed 0-450).
 - 3) Rooms and enclosed spaces:
 - a) Class B (flame spread index 26-75; smoke developed 0-450).
 - 2. Sanitary Standards:
 - a. United States Department of Agriculture (USDA) requirements for food preparation facilities, incidental contact.
 - b. Food and Drug Administration (FDA) 2017 Food Code 6-10.11.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials factory packaged on strong pallets.
- B. Store panels and trim lying flat, under cover and protected from the elements. Allow panels to acclimate to room temperature (range of 60 to 75°F) for 48 hours prior to installation.

1.06 PROJECT CONDITIONS

- A. Environmental Limitations: Buildings are to be fully enclosed prior to installation with sufficient heat (70°F) and ventilation consistent with good working conditions to finish work.
- B. During installation and for not less than 46 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.

C. Provide ventilation to disperse fumes during application of adhesive as recommended by adhesive manufacturer.

1.07 WARRANTY

A. Furnish a one-year guarantee against defects in material and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable manufacturers:
 - 1. Marlite; Dover, OH
 - a. Symmetrix SmartSeam FRP
 - b. Standard FRP
 - 2. Altro; Sante Fe Springs, CA
 - 3. Or approved equal.

2.02 PANELS

- A. FRP-01 Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319.
 - 1. Coating: Multi-layer print, primer and finish coats or applied over-layer.
 - 2. Dimensions:
 - a. Thickness 0.090" nominal
 - b. Width 4'-0"
 - c. Length -4'-0''/8'-0'' As indicated on the drawings.
 - d. Tolerances:
 - 1) Length and Width: +/- 1/8"
 - 2) Square: Not to exceed 1/8" for 4-foot panels, 8 foot panels or 5/32" for 10-foot panels.
 - 3. Properties:
 - a. Flexural Strength: 0.9×10^4 psi per ASTM D 790
 - b. Flexural Modulus: 6.0 x 10⁶ psi per ASTM D 790
 - c. Tensile Strength: 11.5 x 10³ psi per ASTM D 638
 - d. Tensile Modulus: 0.45 x 10⁶ psi per ASTM D 638
 - e. Water absorption: 0.15% per ASTM D 570
 - f. Barcol Hardness: Scratch resistance of 28 per ASTM D 2583
 - g. Izod Impact Strength: 6.0 ft. lbs./in per ASTM D 256
 - 4. Surface/Textures:
 - a. Back Surface:
 - 1) Smooth. Imperfections which do not affect functional properties are not the cause for rejections.
 - b. Front Surface:
 - 1) Smooth

- 5. Panel Color and Groove Color:
 - a. SYM SS1100 White Panel and White Grooves
- 6. Finish Gloss Level
 - a. Satin
- 7. Tile pattern, Groove Direction, Tile Size & Panel Size:
 - a. Chevron panel size 4'x4' nominal
- B. FRP-02 Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319.
 - 1. Coating: Multi-layer print, primer and finish coats or applied over-layer.
 - 2. Dimensions:
 - a. Thickness 0.090" nominal
 - b. Width 4'-0"
 - c. Length –As indicated on the drawings.
 - d. Tolerances:
 - 1) Length and Width: +/- 1/8"
 - 2) Square: Not to exceed 1/8" for 8-foot panels or 5/32" for 10-foot panels.
 - 3. Properties:
 - a. Flexural Strength: 1.7×10^4 psi per ASTM D 790
 - b. Flexural Modulus: 6.0×10^5 psi per ASTM D 790
 - c. Tensile Strength: 8.0 x 10³ psi per ASTM D 638
 - d. Tensile Modulus: 9.43 x 10⁵ psi per ASTM D 638
 - e. Water absorption: 0.17% per ASTM D 570
 - f. Barcol Hardness: Scratch resistance of 30 per ASTM D 2583
 - g. Izod Impact Strength: 7.0 ft. lbs./in per AST D 256
 - 4. Surface/Textures:
 - a. Back Surface:
 - 1) Smooth. Imperfections which do not affect functional properties are not the cause for rejections.
 - b. Front Surface:
 - 1) Pebbled
 - 5. Panel Color:
 - a. P145 Silver
 - 6. Fire Rating:
 - a. Class A

2.03 TRIM/MOLDINGS

A. Moldings:

- 1. Manufacturer's standard moldings as required.
 - a. PVC Trim
 - 1) Thin-wall semi-rigid extruded PVC.
 - 2) Color: As selected by Architect from manufacturer's standard range.

2.04 ACCESSORIES OR HARDWARE

A. Fasteners:

- 1. Non-staining nylon drive rivets.
- 2. Match panel colors.
- 3. Length to suit project conditions.

B. Adhesive

- 1. Complying with ASTM C557:
- 2. Manufacturer's recommended adhesive shall be used.

C. Sealants:

- 1. Silicone Sealant- refer to Section 07 92 00 "Joint Sealants".
- 2. Color: As selected by Architect from manufacturer's standard range.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify all required backing and blocking prior to enclosing framing.
- B. Verify that stud spacing does not exceed 24" o.c.
- C. Decorative fiberglass reinforced wall panels must be applied over a smooth, solid flat subsurface, Gypsum Association level 3 minimum finish.
- D. Verify framing or surfaces are acceptable prior to installing finish materials.
 - 1. Preparatory work is complete.
 - 2. Subsurface is plumb, straight, and true.
 - 3. Surface is securely fastened to structure.
 - 4. No blemishes or nail pops.

3.02 PREPARATION

A. Panels should be opened and allowed to acclimate for 48 hours prior to installation.

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3.03 INSTALLATION OR APPLICATION

- A. Materials shall be installed in strict accordance with manufacturer's directions.
- B. All moldings must provide for a minimum 1/8" expansion joint to insure proper installation.

3.04 CLEANING OR REPAIR

- A. Remove excess sealant from panels and moldings.
- B. Wipe down panels using a damp cloth and mild soap solution.
- C. Refer to manufacturer's specific cleaning recommendations.

END OF SECTION 09 77 20

EXTERIOR PAINTING SECTION 09 91 13

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Surface Preparation:
 - a. Sanding, scraping, putty work, and cleaning of work to be painted.
 - b. Washing, priming, and backpriming of sheet metal work.
 - 3. Painting, staining, and clear finishing, except factory finished materials:
 - a. Exterior surfaces.
 - b. Woodwork, metal work, and trim.
 - c. Mechanical and electrical equipment and piping.
 - Electrical items to be painted include conduit, fittings cabinets, panels, enclosures, junction and pull boxes, hangers, and other associated electrical items which are in "public spaces" and are therefore visible to the building occupants.
 - 2) Mechanical items to be painted shall include, but not be limited to:
 - a) Exposed piping, vessels, ductwork. Color coding of piping per the mechanical specifications.
 - d. Other normally painted surfaces.
 - e. If the color of finish is not specifically listed on the Color Schedule, the Architect shall select from standard colors and finishes available.
 - f. Existing work shall be painted where specified.
 - 4. Backpriming of wood and metal work.
 - 5. Sealing of masonry or concrete surfaces.
 - 6. Painting and special coatings on exposed concrete block surfaces.
 - 7. Electrostatic painting of ornamental metal, handrails, fences, gates, and guardrails..
 - 8. Spray painting of roof and smoke hatches, roof accessories.
 - 9. Touch-up painting.
 - 10. Labor, materials, tools, and equipment.
 - 11. Preparation of submittals.
 - 12. Clean up.
- B. Related Sections:
 - 1. Section 05 73 00: Ornamental Metal
 - 2. Section 08 11 13: Hollow Metal doors and Frames
 - 3. Section 09 91 23: Interior Painting

1.02 REFERENCES

- A. American National Standards Institute (ANSI)
 - 1. Performance Standards.
- B. ASTM International (ASTM)
 - 1. ASTM D16 Standard Terminology for Paint, Related Coatings, Materials and Applications.
 - 2. ASTM D523 Standard Test Method for Specular Gloss.
- C. California Building Code (CBC)
 - 1. CBC 2022 Edition,
- D. California Green Building Standards Code (CGBSC)
 1. CGBSC 2022 Edition, Title 24, Part 11.
- E. San Joaquin Valley Air Pollution Control District (SJVAPCD).
- F. Surface Preparation Standards and Specifications (SSPC)
 - 1. SSPC (PM1) Steel Structure Painting Manual, Vol. 1, Good Painting Practice.
 - 2. SSPC (PM2) Steel Structures Painting Manual, Vol. 2 Systems and Specifications.

1.03 DEFINITIONS

- A. Blocking: Tow painted surfaces sticking together such as a painted door sticking to a painted jamb.
- B. DFT: Dry Film Thickness of the coating.
- C. DTM: Paint that is applied Direct to Metal.
- D. Enamel: Acrylic (water) or alkyd (oil) base paint which dries leaving and eggshell, pearl, satin, semi-gloss or high-gloss enamel finish,
- E. Gloss/Sheen Levels:
 - 1. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
 - 2. Gloss Level 2: Not more than 10 units at 60 degrees and 35 units at 85 degrees, according to ASTM D 523.
 - 3. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
 - 4. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
 - 5. Gloss Level 5: 35 to 70 units at 60 degrees according to ASTM D 523.
 - 6. Gloss Level 6: 70 to 85 units at 60 degrees according to ASTM D 523.
 - 7. Gloss Level 7: More than 85 units at 60 degrees according to ASTM D 523.

- F. Mildew Resistant: Certified products are specially formulated with microbicidal additives that resist mold, mildew and algae growth on the paint film and inhibit growth of bacterial odors.
- G. PDCA: Painting & Decorating Contractors of America www.pdca.org.
- H. RAVOC: Reactivity adjusted VOC 'Reactivity means the ability of a VOC to promote ozone formation.
- I. SSPC: SSPC Surface Preparation Standards and Specifications www.sspc.org.
- J. VOC: Volatile Organic Compounds found in primers, paints, sealers and stains.

1.04 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product or Material Data:
 - 1. Submit product description and test data for all proposed products or materials for review and acceptance by Architect prior to start of work.
 - 2. Submit preparation, priming, and application instructions for each material proposed for use over job specific substrates.
 - 3. Substitutions shall show a line-by-line-item review between the substituted product and the specified product for comparison and the specified Dunn-Edwards or Glidden Professional product in the paint schedule. The comparison shall include:
 - a. % Titanium Dioxide
 - b. % Solids by Weight
 - c. Type of vehicle
 - d. Solvent type
 - e. VOC content Also list allowance per the Calif. Green Building Code
 - f. Finish
 - g. MPI rating
 - h. Scrub test results
 - 4. It will be the discretion of the Architect to accept proposed substitutions.
- C. Samples or Mockups:
 - 1. Submit a complete set of color selection samples of proposed materials for color selection by Architect prior to ordering materials.
 - 2. Submit 8"x10" minimum size brush-out color samples of colors selected for use by the Architect.

1.05 QUALITY ASSURANCE

- A. Performance Requirements:
 - 1. Complete coverage, void of blemishes.
- B. Regulatory Compliance:
 - 1. Materials must meet the standard set by the State of California for environmental protection and hazardous material content.
 - 2. 2022 CBC Chapter 8 "Interior Finishes", Section 803 "Wall and Ceiling Finishes":
 - a. Finish of interior materials shall meet minimum Fire Classification (non-sprinklered spaces):
 - 1) Interior exit stairways, ramps and exit passages:
 - a) Class 'A' (flame spread index 0-25; smoke developed 0-450).
 - 2) Corridors and enclosure for exit access stairways and ramps:
 - a) Class A (flame spread index 0-25; smoke developed 0-450).
 - 3) Rooms and enclosed spaces:
 - a) Class B (flame spread index 26-75; smoke developed 0-450).
 - 3. 2022 California Green Building Standards Code (CGBSC).
- C. Single Source Responsibility:
 - 1. Provide primers and undercoat products from the same manufacturer as the finish coats.
 - 2. Review other sections in which primers are provided to ensure compatibility of the total coating systems for various substrates. On request, furnish information on characteristics or finish materials to ensure use of compatible primers.
- D. Manufacturer Qualifications: Company specializing in manufacturing the products specified with a minimum of ten (10) years of documented experience.
- E. Applicator Qualifications: Company specializing in performing the type of work specified with a minimum of five (5) years of documented experience and approved by manufacturer.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Contractor shall ensure that temperatures, relative humidity, and other environmental conditions for material storage, handling, and installation are maintained within the manufacturer's suggested limits.
 - 1. Apply water-based paints only when the temperature of surfaces to be painted and air temperatures is between 50- and 90-degrees F.
 - 2. Apply solvent-based paints only when the temperature of the surfaces to be painted and the air temperature is between 45- and 95-degrees F.
 - 3. Do not apply paints in snow, fog, rain, or misty conditions when the relative humidity exceeds 85% or when temperatures are less than 5 degrees above the dew point, or to damp or wet surfaces.

- B. Provide adequate lighting for proper installation of materials.
- C. Provide adequate ventilation for proper installation of materials.
- D. Paints, primers, and thinners shall not contain any organic compounds or metals prohibited for use in these products in California.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Handling, storage, and application of the materials covered under this Section of the specifications shall be performed in accordance with the manufacturer's latest written recommendations.
- B. Materials shall be delivered to the site in original unopened containers showing the brand name and product identification number, date of manufacture, color name and number, and VOC content.
- C. Rejected materials shall be immediately removed from the site.
- D. Take precautions to minimize the potential for accumulation of paint fumes and the potential for fire.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates and humidity and temperature limitations.
- C. Do not apply exterior paint and finishes during rain or snow or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperature for Latex Paints: 50° F for exterior unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 foot-candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable manufacturers.
 - 1. Benjamin Moore; Montvale, NJ.
 - 2. Carboline; St. Louis, MO.
 - 3. Devoe Coatings; Santa Fe Springs, CA.
 - 4. Dunn Edwards; City o fCommerce, CA.
 - 5. Glidden Professional; Cleveland, OH.
 - 6. PPG Paints, Pittsburgh, PA
 - 7. Sherwin Williams; Cleveland, OH.
 - 8. Tnemec Industrial Coatings; Kansas City. MO.

2.02 MATERIALS

- A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
 - 1. Provide paints and finishes of a soft past consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties and capable of drying or curing free of streaks or sags.
- B. Use only the highest quality products from the manufacturer's product line.
 - 1. Do not reduce, thin or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- C. All coats shall be the products of the same manufacturer.
- D. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.
- E. Colorants: The use of colorants containing hazardous chemicals, such as ethylene glycol, is prohibited.
- F. Flammability: Comply with applicable code for surface burning characteristics.
- G. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by the Architect from the manufacturer's full line.
- H. Colors: Refer to "Color Schedule".

2.03 ACCESSORY MATERIALS

- A. Accessory materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect all surfaces to receive paint.
- B. Application of paint indicates an acceptance of the underlying surface.
 - 1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 2. Concrete: 12 percent
 - 3. Masonry (Clay and CMU): 12 percent
 - 4. Wood: 15 percent
 - 5. Portland Cement Plaster: 12 percent
- C. Portland Cement Plaster Substrates: Verify that plaster is fully cured, including pH testing to determined that alkalinity is within limits established by the manufacturer.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.02 PREPARATION

- A. General:
 - Remove hardware and hardware access, plates, machined surfaces, light fixtures, and similar items in places that are not to be painted or provide surface-applied protection prior to surface preparation and painting. Remove these items if necessary for complete painting of the items and adjacent surfaces. Coordinate removal of items with the appropriate trade and Construction Manager. Clean surfaces before applying paint or surface treatments. Remove oils and grease from surfaces prior to final cleaning of surfaces.
 - a. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - 2. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces. Items shall be reinstalled in the same manner that they were removed.
 - a. Remove incompatible primers and re-prime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

- B. Concrete, Masonry, and Stucco:
 - 1. Prepare concrete, masonry, and stucco surfaces to be painted by removing efflorescence, caulk, dust, dirt, grease, oils, and other forms of release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
 - a. Use abrasive blast cleaning methods if recommended by the paint manufacturer.
 - b. Determine alkalinity and moisture content of surfaces by performing appropriate test. Pay special attention to concrete masonry unit mortar joints and patch concrete surfaces with Ardex or other approved patching compounds. If surfaces are sufficiently alkaline to cause blistering and burning of finished paint, correct the condition before application per manufacturer's recommendation. Do not paint surfaces where moisture content of surfaces exceeds that permitted in the manufacturer's printed directions.
 - c. Clean concrete floors to receive paint or coatings with a 5% muriatic acid. Flush the floor with water to remove the acid, neutralize with ammonia, then water rinse and allow drying before painting.
- C. Metal:
 - 1. Remove oil grease, mill scale, rust, corrosive materials, and other soluble contaminants using solvents, or cleaning compounds in conjunction with wiping, dipping, steam cleaning, or degreasing.
 - 2. Wash and etch galvanized material.
 - 3. Touch up any abrasions or chips in mill finish prior to application of finish, assuring compatibility of touch-up and patching material with subsequent paint system to be applied.
 - 4. Follow the Structural Steel Painting Council (SSPC) recommendations.
 - 5. Prime the surfaces immediately after preparation.
 - 6. For aluminum substrates, remove loose surface oxidation.
- D. Wood (Painted):
 - 1. Ensure that moisture content of wood is within required limits, 15% maximum.
 - 2. Scrape and sand material to remove dirt, oil, sap, or other materials which will affect the finish coat.
 - 3. Remove any mill glaze by sanding. Wetting of surface and letting dry for 2-3 days, then sanding may be required if heavily glazed.
 - 4. Prime and backprime all material.
- E. Wood (Stained):
 - 1. Ensure that moisture content is within required limits, 15% maximum.
 - 2. Sand material to remove dirt, oil, sap, or other materials that will affect the finish coat. Finish sanding with a 150 fine grit minimum fineness.
 - 3. Remove any mill glaze by sanding. Wetting of surface and letting dry for 2-3 days, then sanding may be required if heavily glazed.
 - 4. Seal all knots and pitch streaks.

3.03 SEQUENCING AND SCHEDULING

A. Sequence work to avoid potential damage from other trades.

3.04 INSTALLATION OR APPLICATION

- A. Performance Requirements:1. Complete coverage, void of blemishes.
- B. Apply paint per Section 3.09 "PAINT SCHEDULE" at the end of this spec section.
- C. Application shall be in accordance with the manufacturer's latest written recommendations.
- D. Mixing and Thinning: Unless otherwise recommended by the manufacturer, paints may be thinned immediately prior to application with an approved manufacturer's thinner and used only within recommended limits of the printed directions when necessary to suit conditions of surface temperature, weather, and application methods. The use of thinner shall not relieve the Contractor from obtaining complete hiding, film thickness, or required gloss. Paints of different manufacturers shall not be mixed.
- E. Additional Requirements:
 - 1. Each coat shall be tinted in a slightly different shade.
 - 2. Paint areas visible through grills, screens, or registers flat black.
 - 3. Door tops, bottoms, and edges shall receive the same finish as door faces.
- F. Exposed plumbing, and plumbing fixtures not factory finished, shall be painted as specified for metal work.
- G. Shop-primed structural steel to be painted shall receive an additional field-applied primer coat per the schedule below. The shop coating shall be considered as a protective coat to inhibit rust during storage and erection. Prior to re-priming, clean all surfaces per SSPC SC-1 with non-petroleum based solvent cleaner.
- H. Block fillers: Provide block fill as scheduled to conform to the following per PDCA Standard P 12-05:
 - 1. Level 3 Premium fill: One or multiple coats of high-performance block filler manufactured to be applied at a high dry film build. Block filler shall be back rolled to eliminate voids and reduce the majority of the masonry profile depth.
- I. Paint may be sprayed when approved by Architect. Non-metal surface (when allowed to be sprayed) must be properly back brushed or rolled.
 - 1. Doors and hollow metal frames shall be spray painted.
 - 2. Wrought iron fences, gates, and handrails not called out as hot-dipped galvanized, shall be spray painted with an electrostatic paint process

- J. Surfaces not exposed to view shall be painted the same as the first coat of finish specified.
- K. Finish tops, bottoms, edges, and ends of wood doors as specified for woodwork.
- L. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed to view:
 - a. Equipment, including panelboards and switchgear.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduits.
 - f. Plastic conduits.
 - g. Tanks that do not have factory-applied final finishes.
 - h. Other items as directed by Architect.
- M. Surfaces for Which Painting is Prohibited:
 - 1. Sprinkler heads.
 - 2. Electrical cover and switch plates.
 - 3. Heat, smoke, and carbon dioxide sensors or similar equipment.
 - 4. Escutcheon plates.
 - 5. Painting shall not obscure manufacturer's labels, UL, FM, or other coderequired labels, identifying color banding, nameplates, or other identification features.
 - 6. Factory-finished items, unless specifically listed to receive a different finish.
 - 7. Glass, brass, or chrome-plated portions of fire protection system control valves, hydrants, and fire department connections

3.05 QUALITY CONTROL

- A. Tolerances:
 - 1. No holidays, sags, runs, crawls, brush marks, or other blemishes.
 - 2. All primers and finish coats shall be applied at manufacturers recommended spread rates to produce manufacturer's recommended dry film thickness per coat.
- B. Field Inspection:
 - 1. Project Inspector
 - 2. Construction Manager
 - 3. Architect of Record
- C. Dry Film Thickness Testing: Owner may engage the service of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.

2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.06 CLEANING OR REPAIR

- A. Keep premises clean during the progress of the work.
- B. Painting shall not occur during dusty conditions.
- C. Thoroughly clean-up work and adjacent areas upon completion of the work.
 - 1. Sweep areas clean.
 - 2. Remove tools, excess materials, and debris from site.
 - 3. Remove spilled or spattered paint.
- D. Touch up all scratched or damaged paint.
- E. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing and refinishing, as approved by Architect and leave in an undamaged condition.

3.07 CONDITION OF FINISHED WORK

- A. Complete coverage.
- B. Sharp, true lines and edges.

3.08 EXTRA STOCK

A. Contractor shall provide extra stock of 5% of each type of paint/coating and color used in new unopened 1-quart containers.

3.09 PAINT SCHEDULE (Based on Dunn-Edwards Paints)

A. Concrete:

- 1. Painted surfaces Eggshell Finish:
 - a. 1st Coat (Primer):
 - 1) Primer, alkali resistant, water-based interior/exterior.
 - a) Benjamin Moore, Ultra Spec Masonry Primer 609
 - b) Dunn-Edwards, EFF-Stop Select ESSL00.
 - c) Sherwin Williams, Loxon Primer A24W8300
 - d) PPG Paints, Perma-Crete Interior/Exterior Alkai Resistant Primer, 4-603XI

- b. 2nd Coat:
 - 1) Exterior 100% Acrylic Eggshell
 - a) Benjamin Moore, Ultra Spec Ext Low Lustre N455
 - b) Dunn-Edwards, Spartashield SSHL30 (Gloss Level 3)
 - c) Sherwin Williams, A-100 Satin, A82-100 Series
 - d) PPG Paints, Speedhide Exterior House and Trim Satin-Acrylic Latex, 6-2045XI Series.
- c. 3nd Coat:
 - 1) Exterior 100% Acrylic Eggshell
 - a) Benjamin Moore, Ultra Spec Ext Low Lustre N455
 - b) Dunn-Edwards, Spartashield SSHL30 (Gloss Level 3)
 - c) Sherwin Williams, A-100 Satin, A82-100 Series
 - d) PPG Paints, Speedhide Exterior House and Trim Satin-Acrylic Latex, 6-2045XI Series.
- 2. Painted surfaces Semi-Gloss Finish:
 - a. 1st Coat (Primer):
 - 1) Primer, alkali resistant, waterbased, interior/exterior.
 - a) Benjamin Moore, Ultra Spec Masonry Primer 609
 - b) Dunn-Edwards, EFF-Stop Select ESSL00.
 - c) Sherwin Williams, Loxon Primer A24W8300
 - d) PPG Paints, Perma-Crete Interior/Exterior Resistant Primer, 4-603XI.
 - b. 2nd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Ultra Spec Ext Satin N448
 - b) Dunn-Edwards, Spartashield SSHL50 (Gloss Level 5)
 - c) Sherwin Williams, A-100 Gloss
 - d) PPG Paints, Speedhide Exterior House and Trim Semi-Gloss Acrylic Latex, 6-900XI Series.
 - c. 3nd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Ultra Spec Ext Satin N448
 - b) Dunn-Edwards, Spartashield SSHL50 (Gloss Level 5)
 - c) Sherwin Williams, A-100 Gloss
 - d) PPG Paints, Speedhide Exterior House and Trim Semi-Gloss Acrylic Latex, 6-900XI Series.

B. Concrete Block:

- 1. Painted surfaces Eggshell Finish:
 - a. 1st Coat (Filler):
 - 1) Latex block filler
 - a) Benjamin Moore, Ultra Spec Block Filler 244
 - b) Dunn-Edwards, Smooth BLOCFIL Premium SBSL00
 - c) Sherwin Williams, Preprite Block Filler B25W25
 - d) PPG Paints, Speedhide Interior/Exterior Masonry Hi-Fill Latex Block Filler, 6-15XI.

- b. 2nd Coat:
 - 1) Exterior 100% Acrylic Eggshell
 - a) Benjamin Moore, Ultra Spec Ext Low Lustre N455
 - b) Dunn-Edwards, Spartashield SSHL30 (Gloss Level 3);
 - c) Sherwin Williams, A-100 Satin
 - d) PPG Paints, Speedhide Exterior House and Trim Satin-Acrylic Latex, 6-2045XI Series.
- c. 3rd Coat:
 - 1) Exterior 100% Acrylic Eggshell
 - a) Benjamin Moore, Ultra Spec Ext Low Lustre N455
 - b) Dunn-Edwards, Spartashield SSHL30 (Gloss Level 3)
 - c) Sherwin Williams, A-100 Satin
 - d) PPG Paints, Speedhide Exterior House and Trim Satin-Acrylic Latex, 6-2045XI Series.
- 2. Painted surfaces Semi-Gloss Finish:
 - a. 1st Coat (Filler):
 - 1) Latex block filler
 - a) Benjamin Moore, Ultra Spec Block Filler 244
 - b) Dunn-Edwards, Smooth BLOCFIL Premium SBSL00
 - c) Sherwin Williams, Prepite Block Filler B25W25
 - d) PPG Paints, Speedhide Interior/Exterior Masonry Hi-Fill Latex Block Filler, 6-15XI.
 - b. 2nd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Ultra Spec Ext Gloss N448
 - b) Dunn-Edwards, Spartashield SSHL50 (Gloss Level 5)
 - c) Sherwin Williams, A-100 Gloss
 - d) PPG Paints, Speedhide Exterior House and Trim Semi-Gloss Acrylic Latex, 6-900XI Series.
 - c. 3rd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Ultra Spec Ext Gloss N449
 - b) Dunn-Edwards, Spartashield SSHL50 (Gloss Level 5)
 - c) Sherwin Williams, A-100 Gloss
 - d) PPG Paints, Speedhide Exterior House and Trim Semi-Gloss Acrylic Latex, 6-900XI Series.
- 3. Color-Stained Concrete Block:
 - a. 1st Coat:
 - 1) 5-parts Micro–Acrylic Emulsion/Siloxane (OKON tint base) to 1-part acrylic masonry paint.
 - a) Benjamin Moore, Ultra Spec Ext Flat Stain 450
 - b) Sherwin Williams, Loxon Vertical Semi-transparent Concrete Stain A31T75
 - c) PPG Paints- PERMA-CRETE® AQUA-Vertical concrete Satin (VSC) 4-51510 series.

- b. 2nd Coat:
 - 1) 5-parts Micro–Acrylic Emulsion/Siloxane (OKON tint base) to 1-part acrylic masonry paint
 - a) Benjamin Moore, Ultra Spec Ext Flat Stain 450
 - b) Sherwin Williams, Loxon Vertical Semi-transparent Concrete Stain A31T75.
 - c) PPG Paints- PERMA-CRETE® AQUA-Vertical concrete Satin (VSC) 4-51510 series.

C. Metal Work:

- 1. Ferrous Metal (structural steel and uncoated ferrous metals):
 - a. 1st Coat (Shop Primer):
 - 1) Red Oxide Alkyd Primer by Section 05 12 00, "Structural Steel Framing" or Section 05 74 00, "Ornamental Metal Work".
 - b. 1st Coat (Primer):
 - 1) Rust Preventative Primer
 - a) Benjamin Moore, Acrylic Metal Primer HP04
 - b) Dunn-Edwards, Bloc-Rust Premium BRP00
 - c) Sherwin Williams, Procryl Primer
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic DTM Primer, 90-1912 Series.
 - c. 2nd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Acrylic DTM S/G HP29
 - b) Dunn-Edwards Aristoshield50 ASHL50 (Gloss Level 5)
 - c) Sherwin Williams, PI WB Alkyd Urethane B53
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
 - d. 3rd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Acrylic DTM S/G HP29
 - b) Dunn-Edwards, Aristoshield50 ASHL50 (Gloss Level 5)
 - c) Sherwin Williams, PI WB Alkyd Urethane B53
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.

Note: When exposed structural steel posts are connected to ornamental metal panels, the painted finish shall be per ornamental metal as listed below.

- 2. Ferrous Metal (Ornamental Metal, Fences, Gates, Exterior Ramps and Handrails not scheduled to be hot dipped galvanized):
 - a. 1st Coat (Shop Primer):
 - 1) Red Oxide Alkyd Primer by Section 05 12 00, "Structural Steel Framing" or Section 05 74 00, "Ornamental Metal Work".

- b. 1st Coat (Primer):
 - 1) Rust Preventative Primer
 - a) Benjamin Moore, Acrylic Metal Primer HP04
 - b) Dunn-Edwards, Bloc-Rust Premium BRP00
 - c) Sherwin Williams, Procryl Primer
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic DTM Primer, 90-1912 Series.
- c. 2nd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Corotech Acrylic DTM S/G HP29
 - b) Dunn-Edwards Aristoshield50 ASHL50 (Gloss Level 5)
 - c) Sherwin Williams, PI WB Alkyd Urethane B53
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
- d. 3rd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Ultra Spec Ext Gloss N448
 - b) Dunn-Edwards, Aristoshield50 ASHL50 (Gloss Level 5)
 - c) Sherwin Williams, PI WB Alkyd Urethane B53
 - d) PPG Paints, Pitt-Tech Plus ÉP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
- 3. Non-Ferrous Metals (galvanized)
 - a. 1st Coat (Primer):
 - 1) Galvanized Metal Primer
 - a) Benjamin Moore, Acrylic Metal Primer HP04
 - b) Dunn-Edwards, Ultrashield Galvanized Metal Primer ULGM00
 - c) Sherwin Williams, DTM Wash Primer B71Y1
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic DTM Primer, 90-1912 Series.
 - b. 2nd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Acrylic DTM S/G HP29
 - b) Dunn-Edwards, Aristoshield50 ASHL50 (Gloss Level 5)
 - c) Sherwin Moore, PI WB Alkyd Urethane 53
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
 - c. 3rd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Acrylic DTM S/G HP29
 - b) Dunn-Edwards, Aristoshield50 ASHL50 (Gloss Level 5)
 - c) Sherwin Williams, PI WB Alkyd Urethane 53
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.

- 4. Non-Ferrous Metals (Aluminum and Brass):
 - a. 1st Coat (Primer):
 - 1) Galvanized Metal Primer
 - a) Benjamin Moore, Acrylic Metal Primer HP04
 - b) Dunn-Edwards, Ultrashield Galvanized Metal Primer ULGM00
 - c) Sherwin Williams, DTM Wash Primer B7141
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic DTM Primer, 90-1912 Series.
 - b. 2nd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Acrylic DTM S/G HP29
 - b) Dunn-Edwards, Aristoshield50 ASHL50 (Gloss Level 5)
 - c) Sherwin Williams, PI WB Alkyd Urethane 53
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
 - c. 3rd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Acrylic DTM S/G HP29
 - b) Dunn-Edwards, Aristoshield50 ASHL50 (Gloss Level 5).
 - c) Sherwin Williams, PI WB Alkyd Urethane 53
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
- 5. Metal Trim and Hollow Metal Doors and Frames (Acrylic DTM Option):
 - a. 1st Coat (Shop Primed):
 - 1) Galvanized per Section 08 11 00, "Hollow Metal Doors and Frames".
 - b. 2nd Coat (Shop Primed):
 - 1) Galvanize etching per Section 08 11 00, "Hollow Metal Doors and Frames".
 - c. 3rd Coat (Primer):
 - 1) Acrylic Metal Primer
 - a) Benjamin Moore, Acrylic Metal Primer HP04
 - b) Carboline, Galoseal WB Primer by Section 08 11 00, "Hollow Metal Doors and Frames".
 - c) Sherwin Williams, Procryl Primer
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.

When "Shop Primed", do not omit field applied primer prior to first coat;

- a) Benjamin Moore, Acrylic Metal Primer HP04
- b) Carboline Galoseal WB.
- c) Devoe 4020PF
- d) Onsite solvent cleaning per SSPC-SP 1 requirements.
- d. 4th Coat:
 - 1) DTM Acrylic Enamel Semi-Gloss
 - a) Benjamin Moore, Acrylic DTM S/G HP29
 - b) Carboline Carbocrylic #3359 MC
 - c) Devoe, Devflex 4216L S/G

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- d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
- 6. Mechanical Equipment:
 - a. Duct Work and Miscellaneous Equipment:
 - 1) As per Ferrous or Non-Ferrous metal listed above, as applicable.

D. Wood:

- 1. Painted Eggshell Finish:
 - a. 1st Coat (Primer):
 - 1) Exterior Acrylic Primer
 - a) Benjamin Moore, Fresh Start 046
 - b) Dunn-Edwards, EZ-Prime Premium EZPR00
 - c) Sherwin Williams, Exterior Latex Wood Primer B42W804
 - d) PPG Paints, Sela Grip Gripper Interior/Exterior 100 Percent Acrylic Latex Primer, 17-921X1 Series.
 - b. 1st Coat:
 - 1) Smooth/Rough Sawn Wood and Siding,
 - a) Benjamin Moore, Fresh Start 046
 - b) Dunn Edwards, EZ-Prime Premium EZPR00
 - c) Sherwin Williams, Exterior Latex Wood Primer B42W804
 - d) PPG Paints, Sela Grip Gripper Interior/Exterior 100 Percent Acrylic Latex Primer, 17-921X1 Series.
 - 2) Synthetic Wood and Siding:
 - a) Benjamin Moore, Fresh Start 046
 - b) Dunn-Edwards, Ultra-Grip Premium UGPR00
 - c) Sherwin Williams, PrepRite ProBlock B51Series
 - d) PPG Paints, Sela Grip Gripper Interior/Exterior 100 Percent Acrylic Latex Primer, 17-921X1 Series.
 - c. 2nd Coat
 - 1) Exterior 100% Acrylic Eggshell
 - a) Benjamin Moore, Ultra Spec Ext Low Lustre N455
 - b) Dunn-Edwards, Spartashield SSHL30 (Gloss Level 3)
 - c) Sherwin Williams, A-100 Satin A82
 - d) PPG Paints, Speedhide Exterior House and Trim Satin-Acrylic Latex, 6-2045XI Series.
 - d. 3rd Coat:
 - 1) Exterior 100% Acrylic Eggshell
 - a) Benjamin Moore, Ultra Spec Ext Low Lustre N455
 - b) Dunn-Edwards, Spartashield SSHL30 (Gloss Level 3)
 - c) Sherwin Williams, A-100 Satin A82
 - d) PPG Paints, Speedhide Exterior House and Trim Satin-Acrylic Latex, 6-2045XI Series.

- 2. Painted Semi-Gloss Finish:
 - a. 1st Coat (Primer):
 - 1) Exterior Acrylic Primer
 - a) Benjamin Moore, Fresh Start 046
 - b) Dunn-Edwards, EZ-Prime Premium EZPR00
 - c) Sherwin Williams, Exterior Latex Wood Primer, B42W8041
 - d) PPG Paints, Sela Grip Gripper Interior/Exterior 100 Percent Acrylic Latex Primer, 17-921X1 Series.
 - b. 1st Coat:
 - 1) Smooth/Rough Sawn Wood and Siding,
 - a) Benjamin Moore, Fresh Start 046
 - b) Dunn-Edwards, EZ-Prime Premium EZPR00
 - c) Sherwin Williams, Exterior Latex Wood Primer, B42W8041
 - d) PPG Paints, Sela Grip Gripper Interior/Exterior 100 Percent Acrylic Latex Primer, 17-921X1 Series.
 - 2) Synthetic Wood and Siding:
 - a) Benjamin Moore, Fresh Start 046
 - b) Dunn-Edwards, Ultra-Grip Premium UGPR00
 - c) Sherwin Williams, Exterior Latex Wood Primer, B42W8041
 - d) PPG Paints, Sela Grip Gripper Interior/Exterior 100 Percent Acrylic Latex Primer, 17-921X1 Series.
 - c. 2nd Coat
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Ultra Spec Ext Satin N448
 - b) Dunn-Edwards, Spartashield SSHL30 (Gloss Level 5)
 - c) Sherwin Williams, A-100 Gloss
 - d) PPG Paints, Speedhide Exterior House and Trim Semi-Gloss Acrylic Latex Paint, 6-900XI Series.
 - d. 3rd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Ultra Spec Ext Satin N448
 - b) Dunn-Edwards, Spartashield SSHL30 (Gloss Level 5)
 - c) Sherwin Williams, A-100 Gloss
 - d) PPG Paints, Speedhide Exterior House and Trim Semi-Gloss Acrylic Latex Paint, 6-900XI Series.
- 3. Painted Gloss Finish:
 - a. 1st Coat (Primer):
 - 1) Exterior Acrylic Primer
 - a) Benjamin Moore, Fresh Start 046
 - b) Dunn-Edwards, EZ-Prime Premium EZPR00
 - c) Sherwin Williams, Exterior Latex Wood Primer
 - d) PPG Paints, Sela Grip Gripper Interior/Exterior 100 Percent Acrylic Latex Primer, 17-921X1 Series.

- b. 1st Coat:
 - 1) Smooth/Rough Sawn Wood and Siding,
 - a) Benjamin Moore, Fresh Start 046
 - b) Dunn-Edwards. EZ-Prime Premium EZPROO
 - c) Sherwin Williams, Exterior Latex Wood Primer, B42W8041
 - d) PPG Paints, Sela Grip Gripper Interior/Exterior 100 Percent Acrylic Latex Primer, 17-921X1 Series.
 - 2) Synthetic Wood and Siding:
 - a) Benjamin Moore, Fresh Start 046
 - b) Dunn Edwards, Ultra-Grip Premium UGPR00
 - c) Sherwin Williams, Exterior Latex Wood Primer, B42W8041
 - d) PPG Paints, Sela Grip Gripper Interior/Exterior 100 Percent Acrylic Latex Primer, 17-921X1 Series.
- c. 2nd Coat
 - 1) Exterior 100% Acrylic Gloss
 - a) Benjamin Moore, Ultra Spec Ext Gloss N449
 - b) Dunn-Edwards, Spartashield SSHL60 (Gloss Level 6)
 - c) Sherwin Williams, Solo 100% Acrylic Gloss A77 Series
 - d) PPG Paints, Speedhide Interior/Exterior High Gloss Acrylic Paint, 6-8534 Series.
- d. 3rd Coat:
 - 1) Exterior 100% Acrylic Gloss
 - a) Benjamin Moore, Ultra Spec Ext Gloss N449
 - b) Dunn-Edwards, Spartashield SSHL60 (Gloss Level 6)
 - c) Sherwin Williams, Solo 100% Acrylic Gloss A77 Series
 - d) PPG Paints, Speedhide Interior/Exterior High Gloss Acrylic Paint, 6-8534 Series.
- 4. Stained Finish:
 - a. 1st Coat:
 - 1) Alkyd exterior wiping oil stain
 - a) Old Masters, Wiping Stain (one coat only)
 - b) Dunn-Edwards, Cabot Semi-Solid Acrylic Stain
 - c) Valspar, Stainseal (V-QYB)
 - d) PPG Paints, Deft Dethane Polyurethane Interior/Exterior Oil-Based 275g/L; DFT26/123/21.
 - b. 2nd Coat:
 - 1) Water-based interior wiping oil stain
 - a) Old Masters Wiping Stain
 - b) Dunn-Edwards, Cabot Semi-Solid Acrylic Stain
 - c) Valspar, Stainseal (V-QYB)
 - d) PPG Paints, Clear Deft Polyurethane Interior/Exterior Water-Based Acrylic DFT259/258/257.

- c. 3rd Coat:
 - 1) Alkyd interior wiping oil stain
 - a) Old Masters Wiping Stain
 - b) Dunn-Edwards, Cabot Semi-Solid Acrylic Stain
 - c) Valspar, Stainseal (V-QYB)
 - d) PPG Paints, Deft Dethane Polyurethane Interior/Exterior Oil-Based 275g/L; DFT26/123/21.
- E. Addition Work:
 - 1. Existing Work:
 - a. Metal:
 - 1) Three (3) coats as specified above.
 - b. Non-Metal:
 - 1) Fill holes and cracks and apply 2 final coats as specified above.
 - a) Touch up primer on larger patch areas (>2 sq.in.)
- F. Equipment Color Codes (unless noted otherwise in the mechanical and plumbing specifications). Color coding of equipment and piping shall follow OSHA and ANSI, and ASME A13 standards.
 - 1. Chilled Water Systems: Piping, pumps, chillers, air separators and expansion tanks Dark Blue.
 - 2. Steam and Condensate: Piping, flash tanks, condensate pumps Yellow
 - 3. Heating Hot Water: Piping, pumps, air separator, heat exchanger, and expansion tanks Orange.
 - 4. Compressed Air Systems Gray
 - 5. Fire Protection System: Piping, valves, alarms, and drains Safety Red
 - 6. Natural Gas Yellow
 - 7. Domestic Cold Water Dark Green
 - 8. Domestic Hot Water Light Green
 - 9. Basic OSHA Guide Principles:
 - a. Red indicates (1) danger, (2) stop or (3) presence of fire Protect equipment.
 - b. Orange marks the dangerous parts of machines or energized equipment which may cut, crush, shock or injure employees. Orange emphasizes these hazards when the guards or enclosures around them are open.
 - c. Yellow warns of physical hazards and means caution. A striped or checkered pattern of yellow and black may be used to help attract attention.
 - d. Blue denotes caution and its use is restricted to marking out-of-service equipment which should not be used.
 - e. Green indicates either the location of safety equipment such as fire aid materials or conveys safety information.
 - f. Purple used for radiation hazards. It may contain a combination of purple and yellow.
 - g. Black & White or a combination of the two are used to designate traffic and housekeeping markings. Stripes, checkers or other variations are often used.

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EXTERIOR PAINTING

INTERIOR PAINTING SECTION 09 91 23

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Surface Preparation:
 - a. Sanding, scraping, putty work, and cleaning of work to be painted.
 - b. Washing, priming, and backpriming of sheet metal work.
 - 3. Painting, staining, and clear finishing, except factory finished materials:
 - a. Interior surfaces.
 - b. Woodwork, millwork, metal work, and trim.
 - c. Mechanical and electrical equipment and piping.
 - Electrical items to be painted include conduit, fittings cabinets, panels, enclosures, junction and pull boxes, hangers, and other associated electrical items which are in "public spaces" and are therefore visible to the building occupants.
 - 2) Mechanical items to be painted shall include, but not be limited to:
 - a) exposed piping, vessels and ductwork. Color coding of piping per the mechanical specifications.
 - d. Other normally painted surfaces.
 - e. If the color of finish is not specifically listed on the Color Schedule, the Architect shall select from standard colors and finishes available.
 - f. Existing work shall be painted where specified.
 - 4. Backpriming of wood and metal work.
 - 5. Sealing of masonry or concrete surfaces.
 - 6. Painting and special coatings on exposed concrete block surfaces.
 - 7. Epoxy coatings for freezer and cold box floors.
 - 8. Electrostatic painting of ornamental metal, handrails and guardrails.
 - 9. Touch-up painting.
 - 10. Labor, materials, tools, and equipment.
 - 11. Preparation of submittals.
 - 12. Clean up.

B. Related Sections:

- 1. Section 06 20 00 Finish Carpentry
- 2. Section 08 11 13 Hollow Metal Doors and Frames
- 3. Section 08 14 00 Wood Doors
- 4. Section 09 21 16 Gypsum Board Assemblies

1.02 REFERENCES

- A. American National Standards Institute (ANSI)
 - 1. Performance Standards.
- B. ASTM International (ASTM)
 - 1. ASTM D16 Standard Terminology for Paint, Related Coating, Materials and Applications.
 - 2. ASTM D523 Standard Test Method for Specular Gloss.
- C. California Building Code (CBC).
 - 1. CBC 2022 Edition, Title 24, Parts 1 and 2 (Volumes 1 & 2).
- D. California Green Building Standards Code (CGBSC)
 1. CGBSC 2022 Edition, Title 24, Part 11.
- E. San Joquin Valley Air Pollution Control District (SJVAPCD)
- F. Surface Preparation Standards and Specifications SSPC)
 - 1. SSPC (PM1) Steel Structure Painting Manual, Vol. 1, Good Painting Practice.
 - 2. SSPC (PM2) Steel Structures Painting Manual, Vol. 2 Systems and Specifications

1.03 DEFINITIONS

- A. Blocking: Tow painted surfaces sticking together such as a painted door sticking to a painted jamb.
- B. DFT: Dry Film thickness of the coating.
- C. DTM: Paint that is applied directly to metal.
- D. Enamel: Acrylic (water based) or alkyd (oil based) paint.
- E. Gloss/Sheen Levels
 - 1. Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
 - 2. Level 2: Not more than 10 units at 60 degrees and 35 units at 85 degrees, according to ASTM D 523.
 - 3. Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
 - 4. Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
 - 5. Level 5: 35 to 70 units at 60 degrees according to ASTM D 523.
 - 6. Level 6: 70 to 85 units at 60 degrees according to ASTM D 523.
 - 7. Level 7: More than 85 units at 60 degrees according to ASTM D 523.

- F. Mildew Resistant: Certified products are specially formulated with microbicidal additives that resist mold, mildew and algae growth on the paint film and inhibit growth of bacterial odors.
- G. PDCA: Painting & Decorating Contractors of America www.pdca.org.
- H. RAVOC: Reactivity adjusted VOC 'Reactivity means the ability of a VOC to promote ozone formation.
- I. SSPC: SSPC Surface Preparation Standards and Specifications www.sspc.org.
- J. VOC: Volatile Organic Compounds found in primers, paints, sealers and stains.

1.04 SUBMITTALS

- A. See section 01 30 00 "Administration Requirements" for submittal procedures.
- B. Product or Material Data:
 - 1. Submit product description and test data for all proposed products or materials for review and acceptance by Architect prior to start of work.
 - 2. Submit preparation, priming, and application instructions for each material proposed for use over job specific substrates.
 - 3. Substitutions shall show a line-by-line-item review between the substituted product and the specified product for comparison and the specified Dunn-Edwards or Glidden Professional product in the paint schedule. The comparison shall include:
 - a. % Titanium Dioxide
 - b. % Solids by Weight
 - c. Type of vehicle
 - d. Solvent type
 - e. VOC content Also list allowance per the Calif. Green Building Standards Code.
 - f. Finish
 - g. MPI rating
 - h. Scrub test results
 - 4. It will be the discretion of the Architect to accept proposed substitutions.
- C. Samples or Mockups:
 - 1. Submit a complete set of color selection samples of proposed materials for color selection by Architect prior to ordering materials.
 - 2. Submit 8"x10" minimum size brush-out color samples of colors selected for use by the Architect.
1.05 QUALITY ASSURANCE

- A. Performance Requirements:
 - 1. Complete coverage, void of blemishes.
 - 2. California Green Building Standards Code (CGBSC).
- B. Regulatory Compliance:
 - 1. Materials must meet the standard set by the State of California for environmental protection and hazardous material content.
 - 2. 2022 CBC Chapter 8 "Interior Finishes", Section 803 "Wall and Ceiling Finishes" and Table 803.13:
 - a. Finish of interior materials shall meet minimum Fire Classification (non-sprinklered spaces):
 - 1) Interior exit stairways, ramps and exit passages:
 - a) Class 'A' (flame spread index 0-25; smoke developed 0-450).
 - 2) Corridors and enclosure for exit access stairways and ramps:
 - a) Class A (flame spread index 0-25; smoke developed 0-450).
 - 3) Rooms and enclosed spaces:
 - a) Class B (flame spread index 26-75; smoke developed 0-450).
- C. Single Source Responsibility:
 - 1. Provide primers and undercoat products from the same manufacturer as the finish coats.
 - 2. Review other sections in which primers are provided to ensure compatibility of the total coating systems for various substrates. On request, furnish information on characteristics or finish materials to ensure use of compatible primers.
- D. Manufacturer's Qualifications: Company specializing in manufacturing the products specified with a minimum of ten (10) years of documented experience.
- E. Applicator Qualifications: Company specializing in performing the type of work specified with a minimum of five (5) years of experience and approved by the paint manufacturer.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Contractor shall ensure that temperatures, relative humidity, and other environmental conditions for material storage, handling, and installation are maintained within the manufacturer's suggested limits.
 - 1. Apply water-based paints only when the temperature of surfaces to be painted and air temperatures is between 50° and 90° F.
 - 2. Apply solvent-based paints only when the temperature of the surfaces to be painted and the air temperature are between 45° and 95° F.
 - 3. Do not apply paints in snow, fog, rain, or misty conditions when the relative humidity exceeds 85% or when temperatures are less than 5 degrees above the dew point, or to damp or wet surfaces.

- B. Provide adequate lighting for proper installation of materials.
- C. Provide adequate ventilation for proper installation of materials.
- D. Paints, primers, and thinners shall not contain any organic compounds or metals prohibited for use in these products in California.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Handling, storage, and application of the materials covered under this Section of the specifications shall be performed in accordance with the manufacturer's latest written recommendations.
- B. Materials shall be delivered to the site in original unopened containers showing the brand name and product identification number, date of manufacture, color name and number, and VOC content.
- C. Rejected materials shall be immediately removed from the site.
- D. Take precautions to minimize the potential for accumulation of paint fumes and the potential for fire.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates and humidity and temperature limitations.
- C. Do not apply materials when relative humidity exceeds 85%; at temperatures less than 5° above the dew point; or to damp or wet surfaces.
- D. Minimum Application Temperatures for Paints: 50° F for interiors unless required by manufacturer's instructions.
- E. Provide lighting level of 80 foot-candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Acceptable manufacturers:
 - 1. Benjamin Moore; Montvale, NJ.
 - 2. Carboline; St. Louis, MO.
 - 3. Devoe Coatings; Santa Fe Springs, CA.
 - 4. Dunn Edwards, City of Commerce, CA.
 - 5. Glidden Professional; Cleveland, OH.
 - 6. PPG Paints; Pittsburgh, PA.
 - 7. Sherwin Williams; Cleveland, OH
 - 8. Tnemec Industrial Coatings; Kansas City, MO.

2.02 MATERIALS

- A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
 - 1. Provide paints and finishes of a soft past consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties and capable of drying or curing free of streaks or sags.
- B. Use only the highest quality products from the manufacturer's product line.
 - 1. Do not reduce, thin or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- C. All coats shall be the products of the same manufacturer.
- D. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.
- E. Colorants: The use of colorants containing hazardous chemicals, such as ethylene glycol, is prohibited.
- F. Flammability: Comply with applicable code for surface burning characteristics.
- G. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by the Architect from the manufacturer's full line.
- H. Colors: Refer to "Color Schedule".

2.03 ACCESSORY MATERIALS

- A. Accessory materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINIATION

- A. Inspect all surfaces to receive paint.
- B. Application of paint indicates an acceptance of the underlying surface.
 - 1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 2. Concrete: 12 percent
 - 3. Masonry (Clay and CMU): 12 percent
 - 4. Wood: 15 percent
 - 5. Portland Cement Plaster: 12 percent
 - 6. Gypsum Board: 12 percent
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured; including pH testing to determine that alkalinity is within limits established by the manufacturer.
- E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.
- F. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- G. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.02 PREPARATION

- A. General:
 - Remove hardware and hardware access, plates, machined surfaces, light fixtures, and similar items in places that are not to be painted or provide surface-applied protection prior to surface preparation and painting. Remove these items if necessary for complete painting of the items and adjacent surfaces. Coordinate removal of items with the appropriate trade and Construction Manager. Clean surfaces before applying paint or surface treatments. Remove oils and grease from surfaces prior to final cleaning of surfaces.
 - a. After completing paining operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

- 2. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces. Items shall be reinstalled in the same manner that they were removed.
 - a. Remove incompatible primers and re-prime substrate with compatible primers or apply tie coat as required to product paint systems indicated.
- B. Concrete, Masonry, and Stucco:
 - 1. Prepare concrete, masonry, and stucco surfaces to be painted by removing efflorescence, caulk, dust, dirt, grease, oils, and other forms of release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
 - a. Use abrasive blast cleaning methods if recommended by the paint manufacturer.
 - b. Determine alkalinity and moisture content of surfaces by performing appropriate test. Pay special attention to concrete masonry units mortar joints and patch concrete surfaces with Ardex or other approved patching compounds. If surfaces are sufficiently alkaline to cause blistering and burning of finished paint, correct the condition before application per manufacturer's recommendation. Do not paint surfaces where moisture content of surfaces exceeds that permitted in the manufacturer's printed directions.
 - c. Prepare concrete floors to receive paint or coatings by means of abrasive blast, shot blast or diamond grind the surface.
- C. Metal:
 - 1. Remove oil grease, mill scale, rust, corrosive materials, and other soluble contaminants using solvents, or cleaning compounds in conjunction with wiping, dipping, steam cleaning, or degreasing.
 - 2. Wash and etch galvanized material.
 - 3. Touch up any abrasions or chips in mill finish prior to application of finish, assuring compatibility of touch-up and patching material with subsequent paint system to be applied.
 - 4. Follow the Structural Steel Painting Council (SSPC) recommendations.
 - 5. Prime the surfaces immediately after preparation.
 - 6. For aluminum substrates, remove loose surface oxidation.
- D. Wood (Painted):
 - 1. Ensure that moisture content of wood is within required limits, 15% maximum.
 - 2. Scrape and sand material to remove dirt, oil, sap, or other materials which will affect the finish coat.
 - 3. Remove any mill glaze by sanding. Wetting of surface and letting dry for 2-3 days, then sanding may be required if heavily glazed.
 - 4. Prime and backprime all material.

- E. Wood (Stained):
 - 1. Ensure that moisture content is within required limits, 15% maximum.
 - 2. Sand material to remove dirt, oil, sap, or other materials that will affect the finish coat. Finish sanding with a 150 fine grit minimum fineness.
 - 3. Remove any mill glaze by sanding. Wetting of surface and letting dry for 2-3 days, then sanding may be required if heavily glazed.
 - 4. Seal all knots and pitch streaks.
- F. Cabinetry and Millwork and Doors:
 - 1. Remove finish hardware, label location and store during progress of work.
 - 2. Sand material to a 300 fine grit minimum fineness.
 - 3. Mask areas as required to protect surrounding work.

3.03 SEQUENCING AND SCHEDULING

A. Sequence work to avoid potential damage from other trades.

3.04 INSTALLATION OR APPLICATION

- A. Performance Requirements:
 - 1. Complete coverage, void of blemishes.
- B. Apply paint per 3.09 "PAINT SCHEDULE" at the end of this spec section.
- C. Application shall be in accordance with the manufacturer's latest written recommendations.
- D. Mixing and Thinning: Unless otherwise recommended by the manufacturer, paints may be thinned immediately prior to application with an approved manufacturer's thinner and used only within recommended limits of the printed directions when necessary to suit conditions of surface temperature, weather, and application methods. The use of thinner shall not relieve the Contractor from obtaining complete hiding, film thickness, or required gloss. Paints of different manufacturers shall not be mixed.
- E. Additional Requirements:
 - 1. Each coat shall be tinted a slightly different shade.
 - 2. Paint areas visible through grills, screens, or registers flat black.
 - 3. Door tops, bottoms, and edges shall receive the same finish as door faces.
- F. Exposed plumbing, and plumbing fixtures not factory finished, shall be painted as specified for metal work.
- G. Shop-primed structural steel to be painted shall receive an additional field-applied primer coat per the schedule below. The shop coating shall be considered as a protective coat to inhibit rust during storage and erection. Prior to re-priming, clean all surfaces per SSPC SC-1 with non-petroleum based solvent cleaner.

- H. Block fillers: Provide block fill as scheduled to conform to the following per PDCA Standard P 12-05:
 - 1. Level 3 Premium fill: One or multiple coats of high performance block filler manufactured to be applied at a high dry film build. Block filler shall be back-rolled to eliminate voids and reduce the majority of the masonry profile depth.
- I. Paint may be sprayed when approved by Architect. Non-metal surface (when allowed to be sprayed) must be properly back-brushed or rolled.
 - 1. Doors and hollow metal frames shall be spray painted.
 - 2. Handrails not called out as hot-dipped galvanized, shall be spray painted with an electrostatic paint process.
- J. Surfaces not exposed to view shall be painted the same as the first coat of finish specified.
- K. Finish tops, bottoms, edges, and ends of wood doors as specified for woodwork.
- L. Painting Fire Suppression, Plumbing and HVAC Electrical, Communication and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed to view:
 - a. Equipment, including panelboards and switchgear.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduits.
 - f. Plastic conduits.
 - g. Tanks that do not have factory-applied final finishes.
 - h. Other items as directed by Architect.
- M. Electrical cabinet frames and doors, fire extinguisher cabinets and frames, both interior and exterior, shall be painted whenever they are exposed to view, or as indicated by Architect with paint as specified for interior and exterior metal work.
 - 1. Cabinet faces & bodies that have a factory applied baked enamel finish shall be left with factory finished, unless noted otherwise.
- N. Surfaces for Which Painting is Prohibited:
 - 1. Sprinkler heads.
 - 2. Electrical cover and switch plates.
 - 3. Heat, smoke, and carbon dioxide sensors or similar equipment.
 - 4. Escutcheon plates.
 - 5. Painting shall not obscure manufacturer's labels, UL, FM, or other coderequired labels, identifying color banding, nameplates, or other identification features.
 - 6. Factory-finished items, unless specifically listed to receive a different finish.
 - 7. Glass, brass, or chrome-plated portions of fire protection system control valves, hydrants, and fire department connections

3.05 QUALITY CONTROL

A. Tolerances:

- 1. No holidays, sags, runs, crawls, brush marks, or other blemishes.
- 2. All primers and finish coats shall be applied at manufacturer's recommended spread rates to produce manufacturer's recommended dry film thickness per coat.
- B. Field Inspection:
 - 1. Project Inspector
 - 2. Construction Manager
 - 3. Architect of Record
- C. Dry Film Thickness Testing: Owner may engage the service of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with the paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.06 CLEANING OR REPAIR

- A. Keep premises clean during the progress of the work.
- B. Painting shall not occur during dusty conditions.
- C. Thoroughly clean-up work and adjacent areas upon completion of the work.
 - 1. Sweep areas clean.
 - 2. Remove tools, excess materials, and debris from site.
 - 3. Remove spilled or spattered paint.
- D. Touch up all scratched or damaged paint.
- E. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing and refinishing, as approved by Architect and leave in an undamaged condition.

3.07 CONDITION OF FINISHED WORK

- A. Complete coverage.
- B. Sharp, true lines and edges.

3.08 EXTRA STOCK

A. Contractor shall provide extra stock of 5% of each type of paint/coating and color used in new unopened 1-quart containers.

3.09 PAINT SCHEDULE (Based on Dunn-Edwards Paints):

A. Concrete:

- 1. Painted Surfaces-Eggshell Sheen:
 - a. 1st Coat (Primer):
 - 1) Primer, alkali resistant, water-based interior/exterior.
 - a) Benjamin Moore, Acrylic Primer 380
 - b) Dunn-Edwards, EFF-Stop Select ESSL00
 - c) PPG Paints, Perma-Crete Interior/Exterior Alkai Resistant Primer, 4-1603XI. Sherwin Williams, Loxon Primer A24W8300
 - d) Sherwin Williams, Loxon Primer A24W8300
 - b. 2nd Coat:
 - 1) Interior 100% Acrylic Eggshell
 - a) Benjamin Moore, Ultra Spec Acrylic Eggshell T538
 - b) Dunn-Edwards, Spartawall SWLL30 (Gloss Level 3)
 - c) PPG Paints, Speedhide Zero Interior Zero VOC Eggshell Latex, 6-5310 Series.
 - d) Sherwin Williams, ProMar 200E/S
 - c. 3rd Coat:
 - 1) Interior 100% Acrylic Eggshell
 - a) Benjamin Moore, Ultra Spec Acrylic Eggshell T538
 - b) Dunn-Edwards, Spartawall SWLL30 (Gloss Level 3)
 - c) PPG Paints, Speedhide Zero Interior Zero VOC Eggshell Latex, 6-5310 Series.
 - d) Sherwin Williams, ProMar 200E/S
- 2. Painted Surfaces-Semi-Gloss Sheen:
 - a. 1st Coat (Primer):
 - 1) Primer, alkali resistant, waterbased interior/exterior.
 - a) Benjamin Moore, Ultra Spec High Build Masonry Primer N609
 - b) Dunn-Edwards, EFF-Stop Select ESSL00
 - c) PPG Paints, Perma-Crete Interior/Exterior Alkai Resistant Primer, 4-1603XI.
 - d) Sherwin Williams, Loxon Primer A24W8300
 - b. 2nd Coat:
 - 1) Interior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Ultra Spec Semi T546
 - b) Dunn-Edwards, Spartawall SWLL50 (Gloss Level 5)
 - c) PPG Paints, Speedhide Zero Interior Zero VOC Semi-Gloss Latex, 6-5510 Series.
 - d) Sherwin Williams, ProMar 200 S/G

- c. 3rd Coat:
 - 1) Interior 100% Acrylic Eggshell
 - a) Benjamin Moore, Ultra Spec Semi T546
 - b) Dunn-Edwards, Spartawall SWLL50 (Gloss Level 5)
 - c) PPG Paints, Speedhide Zero Interior Zero VOC Semi-Gloss Latex, 6-5510 Series.
 - d) Sherwin Williams, ProMar 200 S/G

B. Metal:

- 1. Metal Trim, Metal Doors, and Frames (Semi-Gloss):
 - a. 1st Coat (Shop-Primer):
 - 1) Rust-inhibiting primer by Section 08 11 13, "Hollow Metal Doors and Frames".
 - a) When "Shop Primed" do not omit field applied primer prior to first coat, Devoe 4020PF or Carboline Galoseal WB.
 - b) Onsite solvent cleaning per SSPC-SP 1 requirements.
 - b. 1st Coat (Primer):
 - 1) Alkyd, Anti-Corrosive Metal Primer.
 - a) Benjamin Moore, Metal Primer HP04
 - b) Dunn-Edwards, Bloc-Rust Premium BPRPR00 Series or Enduraprime Rust Preventative Primer ENPR00.
 - c) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic DTM Primer, 90-1912 Series.
 - d) Sherwin Williams, Procryl Primer B66W310
 - c. 2nd Coat:
 - 1) Interior Acrylic Enamel Semi-Gloss.
 - a) Benjamin Moore, Acrylic DTM S/G HP29
 - b) Dunn-Edwards, Aristoshield50 (ASH50) (Gloss Level 50)
 - c) PPG Paints, Breakthrough Interior/Exterior Waterborne Acrylic Semi-Gloss, V62-510 Series.
 - d) Sherwin Williams, PI WB Alkyd Urethane B53 Series
 - d. 3rd Coat:
 - 1) Interior Acrylic Enamel Semi-Gloss.
 - a) Benjamin Moore, Acrylic DTM S/G HP29
 - b) Dunn-Edwards, Artisoshield50 (ASH50) (Gloss Level 50)
 - c) PPG Paints, Breakthrough Interior/Exterior Waterborne Acrylic Semi-Gloss, V62-510 Series.
 - d) Sherwin Williams, PI WB Alkyd Urethane B53 Series

- 2. Aluminum:
 - a. 1st Coat (Primer):
 - 1) Galvanized Metal Primer.
 - a) Benjamin Moore, Acrylic Metal Primer HP04
 - b) Dunn-Edwards, Ultrashield Galvanized Metal Primer ULGM00
 - c) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic DTM Primer, 90-1912 Series.
 - d) Sherwin Williams, Procryl Primer B66W310
 - b. 2nd Coat:
 - 1) Interior Acrylic Enamel Semi-Gloss.
 - a) Benjamin Moore, Acrylic DTM S/G HP29
 - b) Dunn-Edwards, Aristoshield50 (ASH50) (Gloss Level 50)
 - c) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
 - d) Sherwin Williams, PI WB Alkyd Urethane B53 Series
 - c. 3rd Coat:
 - 1) Interior Acrylic Enamel Semi-Gloss.
 - a) Benjamin Moore, Acrylic DTM S/G HP29
 - b) Dunn-Edwards, Aristoshield50 (ASH50) (Gloss Level 50)
 - c) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
 - d) Sherwin Williams, PI WB Alkyd Urethane B53 Series

C. Wall and Ceiling Finishes - General Use Areas:

- 1. Gypsum Wall Board Eggshell:
 - a. 1st Coat (Wall Sealer):
 - 1) Interior Latex Wall Sealer
 - a) Benjamin Moore, Acrylic Primer 380
 - b) Dunn-Edwards; Vinylastic Plus VNPL00
 - c) PPG Paints, Speedhide Interior Quick-Drying Latex Sealer, 6-2.
 - d) Sherwin Williams, ProMar 200 Primer B28W2600
 - b. 2nd Coat:
 - 1) Interior Acrylic Eggshell.
 - a) Benjamin Moore, Ultra Spec Interior Eggshell T538
 - b) Dunn-Edwards, Spartawall SWLL30 (Gloss Level 30)
 - c) PPG Paints, Speedhide Interior Wall Eggshell-Latex Paint, 6-411ZV Series.
 - d) Sherwin Williams, ProMar 200 Eg-Shel B20W12651
 - c. 3rd Coat:
 - 1) Interior Acrylic Eggshell.
 - a) Benjamin Moore, Ultra Spec Interior Eggshell T538
 - b) Dunn-Edwards, Spartawall SWLL30 (Gloss Level 30)
 - c) PPG Paints, Speedhide Interior Wall Eggshell-Latex Paint, 6-411ZV Series.
 - d) Sherwin Williams, ProMar 200 Eg-Shel B20W12651

- 2. Gypsum Wall Board Semi-Gloss Sheen:
 - a. 1st Coat (Wall Sealer):
 - 1) Interior Latex Wall Sealer
 - a) Benjamin Moore, Acrylic Primer 380
 - b) Dunn-Edwards; Vinylastic Plus VNPL0
 - c) PPG Paints, Speedhide Interior Quick-Drying Latex Sealer, 6-2.
 - d) Sherwin Williams, ProMar 200 Primer B28W2600
 - b. 2nd Coat:
 - 1) Interior Acrylic Enamel Semi-Gloss.
 - a) Benjamin Moore, Ultra Spec Interior Semi-Gloss T546
 - b) Dunn-Edwards, Spartawall SWLL50 (Gloss Level 50)
 - c) PPG Paints, Speedhide Zero Interior Zero VOC Semi-Gloss Latex, 6-5510 Series.
 - d) Sherwin Williams, ProMar 200S/G B31
 - c. 3rd Coat:
 - 1) Interior Acrylic Enamel Semi-Gloss.
 - a) Benjamin Moore, Ultra Spec Interior Semi-Gloss T546
 - b) Dunn-Edwards, Spartawall SWLL50 (Gloss Level 50)
 - c) PPG Paints, Speedhide Zero Interior Zero VOC Semi-Gloss Latex, 6-5510 Series.
 - d) Sherwin Williams, ProMar 200S/G B31

D. Wood:

- 1. Painted Surfaces- Eggshell Sheen:
 - a. 1st Coat (Primer):
 - 1) Interior Acrylic Enamel Undercoat
 - a) Benjamin Moore, Fresh Start 046
 - b) Dunn-Edwards; Decoprime (DCPR00)
 - c) PPG Paints, Seal Grip Gripper Interior/Exterior 100 Percent Acrylic Lates Primer, 17-921XI Series.
 - d) Sherwin Williams, Preprite Pro Block B51W620
 - b. 2nd Coat:
 - 1) Interior Acrylic Enamel Eggshell
 - a) Benjamin Moore, Ultra Spec Interior Eggshell T538
 - b) Dunn-Edwards; Spartawall SSWL30 (Gloss Level 3)
 - c) PPG Paints, Speedhide Zero Interior Zero VOC Eggshell Latex, 6-5310 Series.
 - d) Sherwin Williams, ProMar 200 E/S
 - c. 3rd Coat:
 - 1) Interior Acrylic Enamel Eggshell
 - a) Benjamin Moore, Ultra Spec Interior Eggshell T538
 - b) Dunn-Edwards; Spartawall SSWL30 (Gloss Level 3)
 - c) PPG Paints, Speedhide Zero Interior Zero VOC Eggshell Latex, 6-5310 Series.
 - d) Sherwin Williams, ProMar 200 E/S

- 2. Painted Surfaces- Semi-Gloss Sheen:
 - a. 1st Coat (Primer):
 - 1) Interior Acrylic Enamel Undercoat
 - a) Benjamin Moore, Fresh Start 046
 - b) Dunn-Edwards; Decoprime (DCPR00)
 - c) PPG Paints, Seal Grip Gripper Interior/Exterior 100 Percent Acrylic Lates Primer, 17-921XI Series.
 - d) Sherwin Williams, Preprite Pro Block
 - b. 2nd Coat:
 - 1) Interior Acrylic Enamel Semi-Gloss
 - a) Benjamin Moore, Ultra Spec Interior Semi-Gloss T546
 - b) Dunn-Edwards; Spartawall SSWL50 (GIEEoss Level 5)
 - c) PPG Paints, Speedhide Zero Interior Zero VOC Semi-Gloss Latex, 6-5510 Series.
 - d) Sherwin Williams, ProMar 200 S/G
 - c. 3rd Coat:E-100 Series.
 - 1) Interior Acrylic Enamel Semi-Glass
 - a) Benjamin Moore, Ultra Spec Interior Semi-Gloss T546
 - b) Dunn-Edwards; Spartawall SSWL50 (Gloss Level 5)
 - c) PPG Paints, Speedhide Zero Interior Zero VOC Semi-Gloss Latex, 6-5510 Series.
 - d) Sherwin Williams, ProMar 200 S/G
- 3. Stained Finish:
 - a. 1st Coat:
 - 1) Alkyd Interior Wiping Oil Stain
 - a) Benjamin Moore, Old Masters Wiping Stain
 - b) Glidden; 1916 Wood Pride
 - c) PPG Paints, Deft Sanding Sealer Interior Water-Based, DFT61.
 - d) Sherwin Williams, Miniwax Sanding Sealer
 - 2) Sanding Sealer
 - a) Benjamin Moore, Gemini, Sanding Sealer
 - b) Dunn-Edwards; Old Masters Wiping Stain
 - c) PPG Paints, Deft Oil-Based Wood Stain, DFT400.
 - d) Sherwin Williams, Miniwax WB Stain
 - b. 2nd Coat:
 - 1) Polyurethane Gloss Varnish
 - a) Benjamin Moore, Old Masters WB Polyurethane
 - b) Dunn-Edwards, Old Masters WB Polyurethane
 - c) PPG Paints, Deft Sanding Sealer Polyurethane Interior Oil-Based, 350 g/L Gloss DFT 127.
 - d) Sherwin Williams, WB Spar Urethane

- c. 3rd Coat:
 - 1) Polyurethane Gloss Varnish
 - a) Benjamin Moore, Old Masters WB Polyurethane
 - b) Dunn-Edwards, Old Masters WB Polyurethane
 - c) PPG Paints, Deft Sanding Sealer Polyurethane Interior Oil-Based, 350 g/L Gloss DFT127.
 - d) Sherwin Williams, WB Spar Urethane
- 4. Clear Lacquer Finish:
 - a. 1st Coat:
 - 1) Clear Lacquer Sanding Sealer
 - a) Benjamin Moore, Gemini Sanding Sealer
 - b) Dunn-Edwards, Valspar Clean Sanding Sealer
 - c) PPG Paints, SPEEDLINE[™] High Build Clear Lacquer & Sanding Sealer 77-9110 Series.
 - d) Sherwin Williams, GEMINI Stain.
 - b. 2nd Coat:
 - 1) Pre-catalyzed High Solid Clear Lacquer.
 - a) Benjamin Moore, Gemini Pre-Cat S/G Lacquer 275 VOC
 - b) Dunn-Edwards; Valspar Clear Lacquer, 60 Sheen
 - c) PPG Paints, Speedline Lacquer High Build-Clear Gloss 77-9100 Series.
 - d) Sherwin Williams, GEMINI 275 VOC Clear Lacquer.
 - c. 3rd Coat:
 - 1) Pre-catalyzed High Solid Clear Lacquer.
 - a) Benjamin Moore, Gemini Pre-Cat S/G Lacquer 275 VOC
 - b) Dunn-Edwards; Valspar Clear Lacquer, 60 Sheen
 - c) PPG Paints, Speedline Lacquer High Build-Clear Gloss 77-9100 Series.
 - d) Sherwin Williams, GEMINI 275 VOC Clear Lacquer

E. Mechanical Work:

- 1. Ductwork:
 - a. 1st Coat (Etcher):
 - 1) Chemical Etch
 - a) Benjamin Moore, Krud Kutter Metal Etch & Clean
 - b) Dunn-Edwards, Krud Kutter Metal Etch & Clean SC-ME-01.
 - c) Sherwin Williams, DTM Wash Primer B71Y1
 - b. 2nd Coat (Primer):
 - 1) Epoxy, Exterior/Interior Non-Ferrous Metal Primer
 - a) Acrylic Metal Primer HP04
 - b) Dunn-Edwards, Ultra-Grip Select (UGSL00)
 - c) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic DTM Primer, 90-1912 Series.
 - d) Sherwin Williams, Procryl Primer

- c. 3rd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Acrylic DTM S/G HP29
 - b) Dunn-Edwards, Spartashield SSHL50 (Gloss Level 50)
 - c) PPG Paints, Breakthrough Interior/Exterior Waterborne Acrylic Semi-Gloss, V62-510 Series.
 - d) Sherwin Williams, Solo 100% Acrylic A76
- d. 4th Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Acrylic DTM S/G HP29
 - b) Dunn-Edwards, Spartashield SSHL50 (Gloss Level 50)
 - c) PPG Paints, Breakthrough Interior/Exterior Waterborne Acrylic Semi-Gloss, V62-510 Series.
 - d) Sherwin Williams, Solo 100% Acrylic A76
- 2. Piping (Misc. Equipment):
 - a. 1st Coat(Primer):
 - 1) Epoxy, Exterior/Interior Non-Ferrous Metal Primer
 - a) Benjamin Moore, Acrylic Metal Primer HP04 V160
 - b) Dunn Edwards, Ultra-Grip Select (UGSL00)
 - c) PPG Paints, Aquapon WB EP Two-Component Waterborne Epoxy Primer, 98E-46/98E-99 Series.
 - d) Sherwin Williams, Procryl Primer
 - b. 2nd Coat:
 - 1) Aliphatic Urethane Gloss Enamel
 - a) Benjamin Moore, Acrylic DTM S/S HP28
 - b) Dunn-Edwards, IsoFree by Rainguard
 - c) PPG Paints, Aquapon WB EP Two-Component Waterborne Gloss Epoxy Coating, 98E-1/98E-98 Series.
 - d) Sherwin Williams, Acrolon 100
- F. Equipment Color Codes (Equipment Color Codes unless noted otherwise in the mechanical and plumbing specifications). Color coding of equipment and piping shall follow OSHA, ANSI and ASME A13 standards:
 - 1. Chilled Water Systems: Piping, pumps, chillers, air separators and expansion tanks Dark Blue.
 - 2. Steam and Condensate: Piping, flash tanks, condensate pumps Yellow
 - 3. Heating Hot Water: Piping, pumps, air separator, heat exchanger, and expansion tanks Orange.
 - 4. Compressed Air Systems Gray
 - 5. Fire Protection System: Piping, valves, alarms, and drains Safety Red
 - 6. Natural Gas Yellow
 - 7. Domestic Cold Water Dark Green
 - 8. Domestic Hot Water Light Green

- 9. Basic OSHA Guide Principles:
 - a. Red indicates (1) danger, (2) stop or (3) presence of fire Protect equipment.
 - b. Orange marks the dangerous parts of machines or energized equipment which may cut, crush, shock or injure employees. Orange emphasizes these hazards when the guards or enclosures around them are open.
 - c. Yellow warns of physical hazards and means caution. A striped or checkered pattern of yellow and black may be used to help attract attention.
 - d. Blue denotes caution and its use is restricted to marking out-of-service equipment which should not be used.
 - e. Green indicates either the location of safety equipment such as fire aid materials or conveys safety information.
 - f. Purple used for radiation hazards. It may contain a combination of purple and yellow.
 - g. Black & White or a combination of the two are used to designate traffic and housekeeping markings. Stripes, checkers or other variations are often used.

END OF SECTION 09 91 23

VISUAL DISPLAY SURFACES **SECTION 10 11 00**

PART1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Liquid markerboards.
 - a. Standard aluminum-framed markerboards.
 - 3. Trim and accessories.
 - 4. Cleaning of markerboards and tackboards.
 - 5. Submittal Preparation.
 - 6. Clean-up.
- B. Related Sections:
 - 1. Section 09 21 16 **Gypsum Board Assemblies**
 - 2. Section 09 91 23 Interior Painting

1.02 REFERENCES

- A. American National Standards Institute (ANSI)
 - 1. ANSI Z97.1 Safety Glazing Materials Used in Buildings Safety Performance Specifications and Methods of Test.
- B. ASTM International (ASTM)
 - 1. ASTM B221 Standard specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes.
 - 2. ASTM E84 Standard Test Method for Surface burning Characteristics of Building Materials.
- C. Porcelain Enamel Institute (PEI)

1.03 SUBMITTALS

- A. See Section "Administrative Requirements" for submittal procedures.
- B. Product or Material Data:
 - 1. Submit copies of shop drawings and product data to the Architect for approval prior to fabrication.
- A. Shop Drawings: Provide for each type of visual display board including section details indicating trim, face material, colors, core and backing materials, dimensions, joint locations and special anchor details.

- B. Selection Samples: For each finish product specified, two (2) complete sets of color chips representing manufacturer's full range of available colors and patterns.
- C. Verification Samples: Submit samples not less than 12-inch square and framed on two adjacent sides to illustrate materials, finish, color, and configuration of each type of display board required.
- D. Manufacturer's Certificates: certify products meet of exceed specified requirements.
- E. Close-out Submittals: Provide manufacturer's maintenance instructions that include recommendations for cleaning, stain removal maintenance of all components.

1.04 QUALIFY ASSURANCE

- A. Manufacturer's Qualifications: Minimum five (5) years documented experience manufacturing specified products.
- B. Installer Qualifications: Minimum two (2) years documented experience installing specified products.

1.05 DELIVERY, STORGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name manufacturer's identification until ready of installation.
- B. Handle materials to avoid damage.

1.06 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside the manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable manufacturers:
 - 1. Claridge; Copell, TX.
 - 2. Polyvision; Okmulgee, OK.
 - 3. Nelson Adams NACO, San Bernardino, CA
 - 4. Or approved equal.

2.02 MATERIALS

- A. Liquid Marker System Boards:
 - 1. Design Standard:
 - a. Claridge "Series 8" Markerboard
 - 2. Composition:
 - a. Face Sheet: 24-gauge porcelain enameled sheet metal finish.
 - b. Core Material: 7/16" Particle Board.
 - c. Panel Backing: 0.015" Aluminum Foil Panel.
 - d. Frame with extruded aluminum channel trim:
 - 1) 0.50 thick with 5/8" legs.
 - 2) Miter corners.
 - 3) Clear anodized.
 - e. Panel Size: (1) 4'-0" high x 16'-0" long typically unless noted otherwise on Drawings.
 - f. Panel Color: White
 - g. Accessories (per markerboard):
 - 1) Continuous aluminum eraser/marker flat tray with ribbed section and injection molded end caps.
 - 2) 1" Map Rail
 - h. Fused lines per Drawings.

2.03 ACCESSORIES AND ATTACHMENTS

- A. Screws:
 - 1. Phillips oval head countersunk chrome-plated screws.
- B. Provide all toggle bolts, "Rawl" type plugs and glue for installation of boards.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrates are properly prepared to receive visual display boards.
 - 1. No blemishes or nail pops.
- B. Do not begin installation until substrates have been properly prepared.

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VISUAL DISPLAY SURFACES

1. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install boards in locations shown on the Drawings.
- C. Where visual display boards must be partly assembled at project site, use factorysupplied H-bar to maintain proper alignment.
- D. Install visual display boards level and plumb, keeping perimeter trim aligned in accordance with manufacturer's recommendations.
- E. Joints shall be tight.

3.04 ADJUSTING AND CLEANING

- A. Verify that all accessories are installed as required for each unit.
- B. Upon completion of installation, clean surfaces and trim in accordance with manufacturer's recommendations, leaving all materials ready for use.
- C. Replace damaged or defective boards.

3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Notice of Completion.

END OF SECTION 10 11 00

SIGNAGE SECTION 10 14 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Signage.
 - a. Room identification and directional signs.
 - b. Toilet room identification signs.
 - 3. Accessories and associated hardware.
 - 4. Submittal preparation.
 - 5. Clean up.
- B. Related Sections:
 - 1. Section 06 20 00 Finish Carpentry
 - 2. Section 09 21 16 Gypsum Board Assemblies
 - 3. Section 09 91 23 Interior Painting

1.02 REFERENCES

- A. American National Standards Institute (ANSI)
 - 1. ANSI 117.1 For Building and Facilities.
- B. ASTM International (ASTM)
 - 1. ASTM D256 Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
 - 2. ASTM D542 Standard Test method for Index of Refraction of Transparent Organic Plastics.
 - 3. ASTM D570 Standard Test Method for Water Absorption of Plastics.
 - 4. ASTM D638 Standard Test Method for Tensile Properties of Plastics.
 - 5. ASTM D695 Standard Test Method for Compressive Properties of Rigid Plastics.
 - 6. ASTM D696 Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 degrees C and 30 degrees C with a Vitreous Silica Dilatometer.
 - 7. ASTM D732 Standard Test Method for Shear Strength of Plastics by Punch Tool.
 - 8. ASTM D785 Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials.
 - 9. ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

- 10. ASTM D792 Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
- 11. ASTM D1003 Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics.
- 12. ASTM D1929 Standard Test Method for Determining Ignition Temperature of Plastics.
- 13. ASTM D2843 Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics.
- 14. ASTM D3418 Standard Test Method for Transition Temperatures and Enthalpies of Fusion and Crystallization of Polymers by Differential Scanning Calorimetry.
- 15. ASTM D3763 Standard Test Method for High-Speed Puncture Properties of Plastics Using Load and Displacement Sensors.
- 16. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- 17. ASTM E2072 Standard Specification for Photoluminescent (Phosphorescent) Safety Marketing.
- 18. ASTM E2073 Standard Test Method for Photopic Luminance of Photo Luminescent (Phosphorescent) Markings.
- C. Underwriters Laboratories (UL):
 - 1. UL 94 Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.
 - 2. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product specified including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Samples or Mockups:
 - 1. Submit one (1) sample of the manufacturer's complete color range to the Architect for color selection purposes prior to ordering material.
- D. Shop Drawings or Layout Drawings:
 - 1. Submit copies of shop drawings to the Architect for review prior to beginning fabrication.

1.04 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. All signage shall conform to 2022 CBC, Section 11B-703.
 - a. Inspection: Tactile signs shall be field inspected for compliance after installation in accordance with 2022 CBC, Section 11-B.1.1.2.
- B. Manufacturer's Qualifications: Minimum two (2) years documented experience in manufacturing products specified.
- C. Installer's Qualifications: Minimum of two (2) years documented experience installing products specified.
- D. Single Source: Provide each type of specified products as produced by a single manufacturer, including necessary mounting accessories.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in unopened factory packaging.
- B. Inspect materials at delivery to verify there are no defects or damage.
- C. Store products in manufacturer's original packaging until ready for installation in climate-controlled location away from direct sunlight.
- D. Store and dispose of solvent-based materials and materials used with solventbased materials in accordance with requirements of local authorities having jurisdiction.

1.06 PROJECT CONDITIONS

- A. Install products in an interior climate-controlled environment.
- B. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside the manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Plastic Room ID, Directional and Restroom Signage:
 - 1. Mohawk Sign Systems; Schenectady, NY.
 - 2. Allenite Industries; Greensboro, NC
 - 3. Or approved equal.

2.02 MATERIALS

- A. Plastic Room Identification and Directional Signage:
 - 1. Signs shall be sand- carved 1/8" thick phenolic ES plastic laminate.
 - a. The background shall be light suede finish.
 - 1) Color as selected by Architect; Color shall be contrasting (70% minimum) to the adjacent surfaces.
 - b. Characters shall have glossy smooth finish.
 1) Color as selected by Architect; color shall be contrasting (70% minimum) to the sign background color.
 - 2. Signage shall conform to California Code of Regulations, Title 24, Part 2, 2022 CBC Section 11B-703.
 - a. Characters shall be raised 1/32" minimum and shall be Sans Serif upper case characters or simple Serif type accompanied by Grade 2 Braille (see part b below).
 - 1) Character size: Raised characters shall be a minimum 5/8" and a maximum of 2 inches high.
 - Finish and contrast: Characters and their background shall have a nonglare finish. Characters shall contrast with their background with either light characters on a dark background or dark characters on a light background. (CBC 11B-703.5.1).
 - 3) Proportions: Characters shall be selected from fonts where the width of the upper-case "O" is between 60% and 110% of the height of the uppercase letter "T". (CBC 11B-703.5.4). Minimum character heights shall be per CBC Table 11B-703.5.5. Character stroke thickness shall be 10% minimum and 20 % maximum of the height of the character (CBC Section 11B-703.5.7). See details on drawings for heights on room identification signs.
 - 4) Text shall also be written in California Grade No. 2 Braille per CBC Sections 703.3 & 703.4, and Table 703.3.1 and Figure 11B-703.3.1.
 - 5) Pictograms shall comply with CBC Section 11B-703.6.

- B. Restroom Door Signage:
 - 1. Identification symbols on doorways to sanitary facilities shall be as follows:
 - a. Men/Boys sanitary facilities to be identified by an equilateral triangle 1/4 inch thick with edges 12 inches long and a vertex pointing upward, centered on the door between 58" and 60" A.F.F., and the color is to be distinctly different form the color and contrast of the door. (CBC Section 11B-703.7.2.6.1)
 - b. Women/Girls sanitary facilities to be identified by a circle 1/4 inch thick, 12 inches in diameter, centered on the door between 58" and 60" A.F.F. and the color is to be distinctly different from the color and contrast of the door (CBC Section 11B-703.7.2.6.2).
 - c. Unisex sanitary facilities to be identified by a circle 1/4 inch thick 12 inches in diameter with a 1/4-inch-thick triangle superimposed on the circle and within the 12-inch diameter.
 - 1) Color of triangle to contrast with circle, and the circle shall contrast with color of the door. (CBC Section 11B-703.7.2.6.3)
 - 2. Signs shall be 1/4" thick solid acrylic plastic base with 1/8" thick characters chemically welded to base.
 - 3. Mechanically attach signage with tamper-resistant sex bolts.
 - 4. The verbal description to be placed directly below the pictogram.
 - 5. The minimum outside dimension of the pictogram to be 6 inches in height.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify all required backing and blocking prior to enclosing framing.
- B. Start of work shall be considered as acceptance of existing conditions.

3.02 INSTALLATION OR APPLICATION

- A. Install signage per Drawings.
 - 1. Anchorage of signs shall be set in full bed of clear silicone adhesive with tamper resistant wood screws into solid blocking, or concrete screws into block/bricks.
 - 2. Where signs are mounted on windows; signs shall be set in a full bed of clear silicone adhesive.
- B. Installation of room identification signage shall comply with accessibility guidelines per CBC Chapter 11B.
 - Room identification signs shall be installed at + 60" height to the bottom of the top line of text and centered 9" from the strike of door, unless noted otherwise. Reference CBC Sec. 11B-703.4.1.

3.03 SCHEDULES

- A. Room Identification and Miscellaneous Signs:
 - 1. Refer to Signage Schedule on Drawings.
- B. Individual Letters:
 - 1. Refer to Signage Schedule on Drawings.

END OF SECTION 10 14 00

SITE SIGNAGE SECTION 1014 56

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1
 - a. Site Signage
 - b. Accessories and associated hardware
 - c. Concrete footings and poles required for mounting signage
 - d. Submittal preparation
 - e. Clean up
 - B. Related Sections:
 - 1. Section 32 12 16: Asphaltic Concrete Paving
 - 2. Section 32 13 13: Concrete Site Paving
 - 3. Section 32 17 00: Paving Accessories and Striping

1.02 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements: for submittal procedures.
- B. Shop Drawings or Layout Drawings:
 - 1. Submit copies of shop drawings to the Architect for review prior to beginning fabrication.

1.03 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Signs shall comply with the requirements of the California Building Code (CBC).
 - 2. All pass gates with a 48" or less wide gate leaf shall comply with exit door and general door requirements and be supplied with lever hardware (landings, hardware, kick-plate, strike edge clearance, clear opening).

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Signs:
 - 1. ASI Sign Systems
 - 2. Or approved equal

2.02 MATERIALS

- A. Metal Signage:
 - 1. Use 1/16-inch-thick galvanized steel with porcelain enamel graphics and letters.
 - 2. Secure with masonry anchor screws where applicable.
- B. Mounting Post:
 - 1. 2-3/8" outside diameter schedule 40 galvanized post.
 - 2. Concrete:
 - a. By volume, one-part Type II Portland cement to 2-1/2 parts sand, to 3-1/2 parts aggregate.
 - b. Use only enough water to properly hydrate the mix and produce a maximum 4" slump.

PART 3 EXECUTION

3.01 EXAMINATION

A. Start of work shall be considered as acceptance of existing conditions.

3.02 INSTALLATION OR APPLICATION

- A. Install per Drawings and the manufacturer's latest written recommendations, unless shown otherwise.
- B. Mounting Post:
 - 1. Set in concrete footings as shown on the Drawings.
 - 2. Minimum footing size: 10" diameter x 24" deep, set post or sleeve 3" from bottom of footing.
 - 3. Set post in 2-1/2" nominal sleeve (2.469 inside diameter) when signage is in walk or paved areas. Sleeve shall protrude above top of concrete 1" and have 5/16" diameter galvanized tamper resistance sex bolts through pipe and sleeve. Sleeve shall be embedded in concrete to 3" from bottom of footing.
 - 4. Add post extensions to existing post where required to achieve a minimum of 6'-8" clearance to bottom of signage.
 - 5. Where existing paving is sawcut to accept footing- apply asphalt sealant in all overcuts.
 - 6. Post shall be set not more than 1/4" out of plumb over the height of the post.
- C. Concrete:
 - 1. Use only enough water to properly hydrate the mix and produce a maximum 4" slump.
 - 2. Remove loose soil from bottom of footings and tamp earth tight before pouring concrete.

3.03 SCHEDULES

- A. Entry Access Signs:
 - 1. Minimum 6"x6" International Symbol of Accessibility, white lines on blue background on 16 ga. galvanized steel.
- B. Parking and Traffic Control Signs:
 - 1. Accessible Parking Authorization Signage (Detail D6/A-501):
 - a. Unauthorized Vehicles towed away.
 - 2. Accessible Parking Stall Signage (Detail B6/A-501):
 - a. International Symbol of Accessibility.
 - b. Van Accessible Sign where shown.
 - 3. EV Parking Stall Signage (Detail C6/A-501)
 - a. As shown on Drawings.

END OF SECTION 10 14 56

TOILET ACCESSORIES SECTION 10 28 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1;
 - 2. Toilet and accessories.
 - 3. Submittal preparation.
 - 4. Clean up.

B. Related Sections:

- 1. Section 06 10 00 Rough Carpentry
- 2. Section 26 10 00 Basic Electrical Materials and Methods

1.02 REFERENCES

- A. American National Standards Institute (ANSI)
 - 1. ANSI A 117.1 Accessible and Usable Building and Facilities

B. ASTM International (ASTM)

- 1. ASTM A666 Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar.
- 2. ASTM A1008A/A1008M Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened and Bake Hardenable.
- 3. ASTM B456 Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Chromium and Nickel Plus Chromium.
- 4. ASTM F446 Standard Consumer Safety Specification for Grab Bars and Accessories Installed in Bathing Area.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product or Material Data:
 - 1. Submit copies of product specification data to Architect for review prior to installation mounting requirements and rough-in dimensions.
- C. Shop Drawings: Include detail of materials, construction and finish. Include relationship with adjacent construction.
- D. Close-Out Submittals:
 - 1. Submit three (3) complete parts lists for items of this Section.

1.04 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Toilet Accessories shall comply with the requirements of the California Building Code (CBC) including, but not limited to, the following:
 - Note: Toilet Accessories specified are intended to meet or exceed CBC requirements.
 - a. Coat Hook:
 - 1) Install coat hook (on restroom door) at 48" above finished floor.
 - b. Toilet Tissue Dispensers:
 - 1) Toilet tissue dispensers shall be continuous flow type and recessed.
 - a) CBC Section 11B-604.7
 - b) The accessory shall not be located closer than 1-1/2" clear of the tangent point of the grab bar.
 - c. Grab Bar Length and Diameter:
 - Grab bars shall be at least 42 inches long with the front end positioned 24 inches in front of the water closet stool. Grab bars at the back shall not be less than 36 inches long. Set at +33" to +36" to the top of the gripping surface of the grab bar (CBC, Section 11B-609.4)
 a) CBC, Section 11B-604.5 Grab Bars – Location.
 - The diameter or width of the gripping surfaces of a grab bar shall be 1-1/4 inches to 1-1/2 inches or the shape shall provide an equivalent gripping surface.
 - a) CBC, Section 11B-609.2.
 - 2. Toilet accessories required to be accessible shall be mounted at heights according to CBC Section 11B-603.5.
- B. Manufacturer's Qualifications: Approved manufacturer listed in this section, with minimum five (5) years documented experience in the manufacture of product types in use in similar facilities.
 - 1. Product data, including test data from qualified independent testing agency indicating compliance with requirements.
 - 2. List of successful installations of similar products available for evaluation by Architect.
- C. Installer's Qualifications: Company shall be approved by manufacturer and have a minimum of two (2) years documented experience in installing specified products specified.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store, handle, and install materials in conformance with their manufacturer's latest written recommendations.

1.06 WARRANTY

- A. Manufacturer's Warranty for Toilet Accessories: Manufacturer's standard one (1) year warranty for materials and workmanship.
- B. Manufacturer's Warranty for Electric Hand Dryers: Manufacturer's standard five (5) year warranty on parts, except three (3) year warranty on motor brushes from date of Notice of Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable manufacturers:
 - 1. American Specialties, Inc. (ASI); Broomfield, CO.
 - 2. Bobrick Washroom Equipment, Inc.; North Hollywood, CA.
 - 3. Bradley Corp.; Menomonee Falls, WI.
 - 4. Or approved equal.

2.02 MATERIALS

- A. Materials shall be of the top quality of their respective manufacturer's product line unless specified otherwise.
- B. Stainless Steel: ASTM A666 Type 304 (18-8); satin finish exposed surfaces unless otherwise indicated.
- C. Fasteners:
 - 1. Exposed: Screw, bolts and other devices of same material as accessory unit and tamper-and-theft resistant.
 - 2. Concealed: Galvanized steel.
- D. Mirrors: ASTMC1503, mirror glazing quality, consisting of clear float glass ASTM C1036, nominal 6.0 mm thick, triple silver plated with electro copper plated layer and thermosetting, infrared cured paint backing with epoxy protective finish.
- E. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.03 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six (6) keys to Owner's representative.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify all required backing and blocking prior to enclosing framing.
- B. Verify framing or surfaces are acceptable prior to installing finish materials.
 - 1. Preparatory work is complete.
 - 2. Subsurface is plumb, straight, and true.
 - 3. Surface is securely fastened to structure.
 - 4. Painted surfaces are complete.
 - 5. No blemishes or nail pops.
- C. Verify locations and dimensions shown on plans correspond with field conditions.

3.02 INSTALLATION OR APPLICATION

- A. Schedule installation of the work of this Section to avoid damage by other trades.
- B. Install in conformance with the latest written recommendations of the item's manufacturer with the following minimum.
 - 1. Securely attach all items to solid blocking with screws.
 - a. Screws shall penetrate a minimum of 1-1/2" into solid structural blocking, unless otherwise noted.
 - b. Plastic screw inserts will not be permitted.
 - 2. Coordinate blocking layout with framing contractor.

3.03 PROTECTION OR ADJUSTMENTS

A. Protect materials and installed work from damage until project acceptance by owner.

3.04 CONITION OF FINISHED WORK

- A. Accessories shall be installed plumb, level, and true to line.
- B. Accessories shall be in good working order.
- C. Accessories and surrounding finishes shall be clean and undamaged.

3.05 SCHEDULES

A. ACCESSORY SCHEDULE

Quantities and locations shall be as listed in location schedule below:

Designation	Accessory	Bobrick #	ASI#
GB1	36" long grab bar	B-5806 x 36	3701-36
GB2	42" long grab bar	B-5806 x 42	3701-42
CU	Combination Toilet Access	ory B-3091	0487-L
		B-3092	0487-R
MH1	Mop holder	B-239	1308-3
MR1	Mirror with Stainless Steel	Frame B-165 2436	0620-2436
RH1	Robe Hook	B-9541	7308
SD	Soap Dispenser	Owner Furnished, Cont	ractor Installed
PT	Paper Towel Dispenser	Owner Furnished, Cont	ractor Installed

B. LOCATION SCHEDULE

Exact locations shall be as shown on the drawings and/or as directed by Architect during construction:

Designation	Room Numbers	Quantity/Room
GB1	113, 114, 115	Ône
GB2	113, 114, 115	One
CU	113, 114, 115	One
MH1	110	One
MR1	113, 114, 115	One
RH1	113, 114, 115	One
SD	111, 112, 113, 11	4, 115 One
PT	111, 112, 113, 11	4, 115 One

END OF SECTION 10 28 00

FIRE PROTECTION SPECIALTIES SECTION 10 44 00

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

- 1. Provisions set forth in Divisions 0 and 1.
- 2. Fire extinguishers.
- 3. Fire extinguisher cabinets.
- 4. Accessories and associated hardware.
- 5. Submittal preparation.
- 6. Clean up.

B. Related Sections:

- 1. Section 06 10 00 Rough Carpentry
- 2. Section 09 91 23 Interior Painting
- 3. Section 21 00 00 Fire Sprinklers

1.02 REFERENCES

A. National Fire Protection Association (NFPA)
 1. NFPA 10; Standard for Portable Fire Extinguishers

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product or Material Data:
 - 1. Submit five (5) copies of product information literature to the Architect for review prior to installation.
 - a. Indicate operating features, physical size, mounting recommendations, anchorage details, and rough-in requirements.
- C. Samples or Mockups:
 - 1. Submit one (1) sample of the manufacturer's complete color range to the Architect for color selection purposes prior to ordering material.
- D. Close-Out Submittals:
 - 1. Submit three (3) copies of manufacturer's operation and maintenance information.
 - a. Include testing and recharge schedules.
 - b. Document re-certification process.
 - 2. Submit three (3) copies of certification of testing and recharge indicating that service occurred within one week of the project's final punch list.

1.04 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Fire extinguisher cabinets shall be installed complying with 2022 CBC Sections 11B-309 and 11B-307 for accessibility.
 - a. Cabinets shall not protrude more than 4" from the wall.
 - b. Mount +40" max to operating mechanism or handles.
- B. Fire extinguishers shall be dry chemical type and be listed by the California State Fire Marshal (CSFM).
 - 1. Rating shall be as shown on the Fire Extinguisher Schedule at the end of this Section.

1.05 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Do not install fire extinguishers in sub-freezing temperatures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable manufacturers:
 - 1. Activar Construction Group/J. L. Industries; Bloomington, MN.
 - 2. Larsen's Manufacturing Co.; Coon Rapids, MN.
 - 3. Potter-Roemer; City of Industry, CA
 - 4. Or approved equal.

2.02 MATERIALS

- A. Fire extinguisher cabinets shall be constructed of 18-gauge minimum thickness material.
 - 1. Exterior finish shall be baked-on prime coat.
 - 2. Interior finish shall be white baked-on enamel.
 - 3. Cabinet doors shall be clear acrylic type with hollow steel frame.
 - a. Use continuous piano hinge assembly.
 - b. Door shall open 180 degrees.
 - 4. Cabinets shall have tight seams and corners.
 - 5. Cabinet, flange, and door construction shall be welded, with welds ground smooth.
 - 6. Pre-drill holes for anchorage.
2.03 ACCESSORIES OR HARDWARE

- A. Supply and install fire extinguisher wrap around wall brackets for surface-mounted extinguishers.
 - 1. Size screws for a minimum 1-1/2" penetration into stud or solid blocking.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify all required backing and blocking prior to enclosing framing.
- B. Verify rough opening sizes.
- C. Start of work shall be considered as acceptance of existing conditions.

3.02 INSTALLATION OR APPLICATION

A. Install per the manufacturer's latest written recommendations.

3.03 CONDITION OF FINISHED WORK

A. The completed installation shall be clean, plumb, with no visible imperfections.

3.04 SCHEDULES

- A. FIRE EXTINGUISHER SCHEDULE <u>TYPE CABINET TYPE</u> EXTINGUISHER TYPE FE1 Semi-recessed (#7322-BA-6-RR-VR) 10# 4A:80B:C (#3010)
 - Note: Model Numbers shown in parentheses are Potter-Roemer indicating quality standard.
- B. Refer to drawings for type and location each fire extinguisher assembly.

END OF SECTION 10 44 00

GROUND SET FLAGPOLES SECTION 10 75 00

PART 1 GENERAL

3.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1
 - 2. Flagpoles and top balls.
 - 3. Pulleys, lanyards, locking lanyard boxes, fittings, and accessories.
 - 4. Anchorage and base system and associated hardware.
 - 5. Submittal preparation.
 - 6. Clean up.
- B. Related Sections:
 - Section 32 13 13:
 Section 26 10 00 Site Concrete Paving
 - **Basic Electrical Methods Materials**

3.02 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements' for submittal procedures.
- B. Product or Material Data:
 - 1. Submit copies of the manufacturer's latest written installation recommendations.
- C. Shop Drawings or Layout Drawings:
 - 1. Submit shop drawings to the Architect for review prior to beginning fabrication.

3.03 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Company with a minimum of three (3) years documented experience in the manufacturing of specified products.
- B. Installers Qualifications: Contractor with a minimum of two (2) years documented experience in installing specified products.
- C. Performance Requirements:
 - 1. Installed pole without flag shall resist winds of 100 miles per hour without permanent deflection.

3.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to project site in original factory containers.
- B. Store materials in original undamaged containers to protect from damage.

C. Comply with manufacturer's instructions and recommendations for handling.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Baartol Company, Inc.; Lexington, KY.
 - 2. Eder Flag Mfg. Co.; Oak Creek, WI
 - 3. Or approved equal.

2.02 MATERIALS

- A. Flagpoles shall be ground-set type:
 - 1. Nominal height: 35 ft.
 - 2. Lanyards: Exposed with locking boxes
- B. Aluminum shall conform to ASTM B221, alloy.
 - 1. Finish shall be fine machine type.
 - a. Use high quality oxide polishing cloths.
 - 2. Coat with Permacote 62 wax, Baartol Lustratex or equal.
- C. Pole shall be of one-piece seamless cone-tapered construction.
 - 1. Taper 1" in 5'-6".
- D. Pole Size (tapered):
 - 1. 7" diameter at butt.
 - 2. 3.5" diameter at top.
 - 3. 0.188" minimum wall thickness.
- E. Ground shall be at least 48" long 3/4" diameter copper rod connected to the pole by at least a #6 AWG copper wire.

2.03 ACCESSORIES OR HARDWARE

- A. Top Ball:
 - 1. 8" diameter spun aluminum with integral "External Halyard Beacon" by The Flag Company, Inc. (www.flagpolewarehouse.com) or equal.
 - a. External Halyard Beacon to fit on 3 1/2" diameter top poles.
 - b. 359-degree revolving function
 - c. Pole length + 10' of wire provided with unit.
- B. Truck Assembly shall be non-fouling, cast aluminum type with stainless steel ball-bearing mechanisms.
- C. Locking Cleat Cover Box:
 - 1. Finish to match pole.

- D. Satin finished aluminum.
 - 1. 18" diameter ornamental base flash collar.
- E. Flagpole Lighting System
 - 1. 110v, LED lighting positioned to illuminate flag

2.04 FINISH

- A. Aluminum components shall have a clear-brushed satin finish, waxed.
- B. Steel components shall be factory-baked enamel.
- C. Below grade portions of flagpole assembly and area of contact between dissimilar metals shall be coated with an asphaltic paint.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify size and placement of concrete foundation prior to beginning installation.
- B. Start of work shall be considered as acceptance of existing conditions.

3.02 DELIVERY, STORAGE, AND HANDLING

- A. Handle flagpoles and accessories in accordance with the manufacturer's latest written recommendations.
- B. Properly protect flagpoles and accessories during shipping and storage.

3.03 INSTALLATION OR APPLICATION

- A. Install per the manufacturer's latest written recommendations.
- B. Properly ground the entire assembly.
- C. Halyard wiring to be concealed within pole assembly.

3.04 PROTECTION OR ADJUSTMENTS

A. Check and adjust fittings for proper smooth operation.

END OF SECTION 10 75 16

ROLLER WINDOW SHADES SECTION 12 24 13

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1
 - 2. Roller shades:
 - a. Manual operation and accessories.
 - 3. Submittal preparation
 - 4. Clean-up
- B. Related Sections:
 - 1. Section 06 10 00 Rough Carpentry
 - a. Wood blocking and grounds for mounting roller shades and accessories.
 - 2. Section 09 21 16 Gypsum Board Assemblies
 - a. Coordination with gypsum board assemblies for installation of shade pockets, closures and related accessories.
 - 3. Section 09 51 00 Acoustical Ceilings
 - a. Coordination with suspended acoustical ceiling systems for installation of shade pockets, closures and related accessories.

1.02 REFERENCES

- A. ASTM International (ASTM)
 - 1. ASTM E2180 Standard Test Method for Determining the Activity of Incorporated Antimicrobial Agent(s) in Polymeric or Hydrophobic Materials.
 - 2. ASTM G21 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- B. Cradle to Cradle to Products Innovation Institute (C2C)
 - 1. C2C (DIR) C2C Certified Products Registry.
- C. National Fire Protection Association (NFPA)
 - 1. NFPA 70 National Electrical Code, Most Recent Edition Adopted by Authority Having Jurisdiction, including all applicable Amendments and Supplements.
 - 2. NFPA 701 Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.
- D. Underwriters Laboratories (UL)
 - 1. UL 325 Standard for Door, Drapery, Gate, Louver and Window Operators and Systems; Current Edition, including all Revisions.
 - 2. UL (GGG) Greenguard Gold Certified Products, Current Edition.

E. Window Covering Manufacturers Association (WCMA)
1. ANSI/WCMA A100.1 – Safety of Window Covering Products.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product Data: Manufacturer's printed product data for products specified including materials, finishes, dimensions, profiles, mountings and accessories.
 - 1. Preparation instructions and recommendations.
 - 2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes, accessories and operating instructions.
 - 3. Storage and handling requirements and recommendations.
 - 4. Mounting details and installation methods.
 - 5. Manufacturer's instructions: Include storage, handling, protection, examination, preparation and installation.
 - 6. Project Record Documents: Record actual locations of control system components and show interconnecting wiring.
 - 7. Operation and Maintenance Data: Component list with part numbers, and operation and maintenance instructions.
 - 8. Motorized Shades: Power requirements. Typical wiring diagrams including integration of EDU controllers with building management system, audiovisual and lighting systems as applicable.
 - a. If using PoE motors, include integration of PoE motor hubs, shade motors, wall controllers, software programming, ability to integrate with building management system, audiovisual and lighting control systems as applicable.
- C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.
 - 1. Prepare control wiring diagrams based on zones, switching and operational requirements.
 - 2. Include one-line diagrams, wire counts, coverage patterns, and physical dimensions for each item.
 - 3. Provide location plan showing all motor locations, switch locations and control zones as per the performance requirements of the specifications. All switches, sensors and other control accessories must clearly be shown and called out in a bill of materials.
 - 4. Provide location plan showing all manual shade control locations. Crossreference furniture plans for optimal positioning of chains.
 - 5. Provide elevations drawings showing shade band layout. Indicate any necessary seam or batten locations and shall align with horizontal mullions where possible.

- D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.
- E. Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements.
 - 1. Shadecloth Sample: Mark face of material to indicate interior faces.
 - a. Test reports indicating compliance with specified fabric properties.
 - b. Verification Samples: 6 inches square, representing actual materials, color and pattern.
- F. Maintenance Data: Bill of materials for all components with part numbers. Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.04 QUALITY ASSURANCE

- A. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.
- B. Manufacturer Qualifications: Obtain roller shades system through one source from a single manufacturer with a minimum of ten (10) years' experience and minimum of five (5) projects of similar scope and size in manufacturing products comparable to those specified in this Section.
- C. Installer of Roller Shade System Qualifications: Installer trained and certified by the manufacturer with a minimum of ten (10) years' experience in installing products comparable to those specified in this Section.
- D. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.
- E. ShadeCloth Anti-Microbial Characteristics: 'No Growth' per ASTM results for fungi ATCC9642, ATCC9644 and ATCC9645 and ASTM E2180.
- F. ShadeCloth Cleanability and Disinfecting: ShadeCloth must meet cleanability and disinfecting requirements via third-party testing to comply with BIFMA HCF 8.1-2014 standards using chemical solutions compliant with EPA guidelines for use against COVID-19.
- G. Environmental Certification: Submit written certification from the manufacturer, including third-party evaluation, recycling characteristics, and perpetual use certification as specified. Initial submittals, which do not include the Environmental Certification will be rejected. Materials that are simply 'PVC free' without identifying their inputs shall not qualify as meeting the intent of this specification and shall be rejected.

- H. Third-Party Evaluation: Provide documentation stating the shade cloth has undergone third-party evaluation for all chemical inputs, down to a scale of 100 parts per million, that have been evaluated for human and environmental safety. Identify all inputs, which are known as carcinogenic, mutagenic, teratogenic, reproductively toxic or endocrine disrupting. Also identify items that are toxic to aquatic systems, contain heavy metals or organohalogens. The material shall contain no inputs that are known problems to human or environmental health per the above major criteria, except for an input that is required to meet local fire codes.
- I. Recycling Characteristics: Provide documentation that the shade cloth can and is part of a closed loop of perpetual use and not be required to be down cycled, incinerated or otherwise thrown away. Scrap material can be sent back to the mill for reprocessing and recycling into the same quality yarn and woven into new material, without down cycling. Certify that this process is currently underway and will be utilized for this project.
- J. Perpetual Use Certification: Certify that at the end of the useful life of the shade cloth, that the material can be sent back to the manufacturer for recapture as part of a closed loop of perpetual use and the material can and will be reconstituted into new yarn, for weaving into new shade cloth. Provide information on each shade band indicating that the shade band can be sent back to the manufacturer for this purpose.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings.
- B. Store and handle products per manufacturer's recommendations.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.07 WARRANTY

- A. Roller Hardware and Chain Warranty: Manufacturer's standard non-depreciating, transferrable warranty for interior shading.
 - 1. Shade Hardware 10 years unless otherwise indicated:
 - a. ThermoVeil or Equinox Blackout shade fabric; 25 years.
 - 2. All Mecho Shadecloth:
 - a. Manufacturer's standard 25-year warranty.

3. Roller Shade Installation: One year from date of Notice of Completion, not including scaffolding, lifts or other means to reach inaccessible areas, which are deemed Owners responsibility.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Acceptable Manufacturer:
 - 1. MechoShade Systems, LLC; Long Island City, NY.
 - 2. Or approved equal.
- B. Basis of Design:
 - 1. Manual Operation Roller Shade System: Mecho/5 System manufactured by MechShade Systems.
 - 2. Motorized Operation Roller Shade System: ElectroShade System manufactured by MechoShade Systems.

2.02 APPLICATIONS/SCOPE

- A. Roller Shade Schedule:
 - 1. Shade Type 1: Manual operating, chain drive, sunscreen single roller shades and related mounting systems and accessories as indicated on Drawings.
 - 2. CPSC Compliance: All manually operated window coverings with accessible cords, chains, continuous loop cords, etc. shall meet all current Federally mandated CPSC (Consumer Products Safety Commission) safety standards at time of manufacturing. Depending on the product type, additional hardware components may be required and added to meet new regulatory compliant anti-ligature requirements.
 - 3. WCMA Compliance: Chain tensioning device complying with ANSI/WCMA A100.1- 2022 manufactured on every manual roller shade.

2.03 ROLLER SHADES, MANUAL OPERATION AND ACCESSORIES

- A. Shade System, General:
 - 1. Components capable of being removed or adjusted without removing mounted shade brackets, or cassette support channel.
 - 2. Smoothly operation raising or lowering shades.
 - 3. Cradle-to-Cradle certified and listed in C2C (DIR).
 - 4. Environmental Product Declaration (EPD): Published disclosure of product's environmental impacts based on a full life cycle Assessment (LCA). Manufacturers must have EPD certification by an independent third-party evaluation service.

- B. Manually Operated Roller Shade System:
 - 1. Description:
 - a. Shade Type:
 - 1) Single Roller
 - b. Drop Position: Regular roll.
 - c. Mounting:
 - 1) Wall mounted
 - d. Size: Field Verify windows sizes.
 - 2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
 - a. Material: Steel, 1/8 inch thick. Styrene based plastics, and/or polyester, or reinforced polyester shall not be accepted.
 - b. Single shade operation width: Up to 180 inches dependent on fabric.
 - 3. Roller Tubes:
 - a. Material: Extruded aluminum.
 - b. Size: As recommended by manufacturer, selected for sustainability for installation conditions, span and weight of shades.
 - c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.
 - d. Roller tubes to be capable of being removed and reinstalled without affecting roller shade limit adjustments.
 - 4. Hembars: Designed to maintain bottom of shade straight and flat.
 - a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.
 - 5. Clutch Operator: Manufacture's standard material and design integrated with bracket/brake assembly.
 - a. Heavy-duty, 1/8" steel mounting bracket and integrated steel brake, clutch and sprocket assembly rigidly affix the shade support and user control to the building structure fully independent of the roller tube components.
 - b. Permanently lubricated maintenance-free brake assembly employs an oil-impregnated steel hub with wrapped spring clutch.
 - c. The brake must withstand a minimum pull force of 50 pounds in the stopped position.
 - d. Direct drive clutch requires no interstitial gear stages or plastic parts between the building structure and clutch ensuring reliable operation across the full range of shade sizes.
 - e. Maximum shade hanging weight of 30 pounds.
 - 6. Drive Chain: Continuous loop stainless steel beaded ball chain, 95-pound minimum breaking strength. Provide upper and lower limit stops.

- 7. Hardware: Lifts single band or multiband shade assemblies:
 - a. Lifting Force: 3.5 to 8.5 pounds for shade assemblies with a shade band hanging weight, not including mounting hardware, of 30 pounds.
 - b. A direct drive clutch provides the best user experience by managing the user pull force while using the fewest number of chain pulls to position a shade.
 - c. Backward compatible to components including facia, regular and reverse roll, pockets, and wall-mounting accessories.
 - d. Includes offset drive capability, left/right, front, or back to allow for utilization of room-darkening blackout channels.
 - e. Allows for ease of operation when obstructions do not allow for direct drive chain access.
 - f. Offset chain drive shall not cause an increase of friction or pull force when operated up to a 26-degree angle from vertical.
- 8. Accessories:
 - a. Fascia: Removable extruded aluminum fascia, size as required to conceal shade mounting, attachable brackets without exposed fasteners.
 - 1) Finish: Baked enamel.
 - a) Color to be selected from manufacturer' standard colors.

2.04 ROLLER SHADE FABRICATION

- A. Field measure finished openings prior to ordering or fabrication.
- B. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances.
 - 1. Vertical Dimensions: Fill Opening from Head to Sill: 1/2-inch space between bottom bar and windowsill.
 - 2. Vertical Dimensions: Fill Opening from Head to Sill: 1/2-inch space between bottom bar and finished floor.
 - 3. Horizontal Dimensions: Outside mounting.
 - a. Extend shades beyond jambs on each side 1 inch.

2.05 SHADE FABRIC

- A. Basis of Design: Shade fabric as manufactured by MechoShade Systems.
 - 1. Solar Shadecloths:
 - a. Fabric: ThermoVeil 1300, 5 percent open. 2x2 basket-weave pattern of PVC and polyester blend, also 126 inches wide.
 - 1) Color: Eggshell #1316
 - 2) Low-Emitting Material Certification: Greenguard Gold certified and listed in UL (GGG).
 - 3) Health Product Declaration (HPD): Published declaration with full disclosure of known hazards.

- 4) Environmental Product Declaration (EPD): Published disclosure of product's environmental impacts based on a full Life Cycle Assessment (LCA). The manufacturer must have EPF certification by an independent third-party evaluation service.
- 2. Performance Requirements:
 - a. Flammability per NFPA 701: Pass. Large- or small-scale test.
 - b. Fungai Resistance: No growth when tested per ASTM G21.
 - c. Cleanability and Disinfecting: Shadecloth must meet cleanability and disinfecting requirements via third-party testing to comply with BIFMA HCF 8.1-2014 standards using chemical solutions compliant EPA guidelines for use against COVID-19.
- 3. Fabrication:
 - a. Fabric Orientation: Railroaded, fabric is turned 90 degrees off the roll.
 - b. Battens: Manufacturer's standard material, full width of shade, and enclosed in welded shade fabric pocket, locate as indicated on Drawings.
 - c. Seams for Railroad Fabric: Manufacturer's standard ream, locate as indicated on Drawings.
 - d. Welded Zipper Edge: Full height on both sides of fabric ensuring smooth operation within ShadeLoc channels.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until the substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Start of installation shall be considered acceptance of substrates.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using methods recommended by manufacturer for achieving the best result for substrate under the project conditions.
- C. Coordinate with window installation and placement of concealed blocking to support shades.

3.03 INSTALLATION

- A. General:
 - 1. Window Covering Contractor (WC) shall provide an onsite Project Manager and shall be present for all related jobsite scheduling meetings.

- B. Manual Operated Roller Shade:
 - 1. Contractor Furnish and Install Responsibilities:
 - a. WC shall supervise the roller shade installation and setting of intermediate stops of all shades.
 - b. WC shall be responsible for field inspection on an area-by- area and floorby-floor basis during construction to confirm proper mounting conditions per approved shop drawings.
 - c. Verification of Conditions: examine the areas to receive the work and the conditions under which the work would be performed and notify General Contractor and Owner of conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected. Commencement of installation shall constitute acceptance of substrate conditions by the installer.
 - d. WC shall provide accurate to 0.0625" inch; field measurements for custom shade fabrication on the Roller Shades manufacturers input forms.
 - e. WC Installer shall install roller shades level, plumb, square, and true according to manufacturer's written instructions, and as specified here in. Blocking for roller shades installed under the contract of the interior General Contractor shall be installed plumb, level, and fitted to window mullion as per interior architect's design documents and in accordance with industry standard tolerances. The horizontal surface of the shade pocket shall not be out-of-level more than 0.625" over 20 linear feet.
 - f. Shades shall be located so the shade band is not closer than 2 inches to the interior face of the glass. Allow proper clearances for window operation hardware.
 - g. Adjust, align and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
 - h. Installer shall set Upper and Lower limits of all manual shade bands and assure alignment in accordance with the above requirements.
 - i. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
 - j. WC shall train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.
 - a) Use operation and maintenance manual as a reference, supplemented with additional training materials as required.

3.04 PROTECTION AND CLEANING

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Notice of Completion.
 - 1. Clean soiled shades and exposed components as recommended by manufacturer.
 - 2. Replace shades that cannot be cleaned to "like new" condition.

END OF SECTION 12 24 13

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FIRE SPRINKLERS SECTION 21 00 00

PART 1 – GENERAL

1.01 SCOPE.

- A. WORK INCLUDED
 - 1. Provide a complete hydraulically calculated automatic fire sprinkler system for the new building extending from the point of connection as indicated on the drawings to all areas of the building, including all necessary piping, devices, controls, labor, etc.

1.02 CODES AND STANDARDS

- A. All work and materials shall conform 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.
- B. Applicable codes and standards shall include but are not necessarily limited to:
 - 1. California Code of Regulations, Title 19, Public Safety, State Fire Marshal.
 - 2. National Fire Protection Association Standards, 13, 13A, and 24.
 - 3. Development Department, Inspection Division, County of Kern.
 - 4. California Fire Code as amended and adopted by County of Kern.
 - 5. California Building Code.
 - 6. American Water Works Association (AWWA)
 - 7. Cast Iron Soil Pipe Institute (CISPI)
 - 8. National Electrical Code (NEC)
 - 9. National Electrical Manufacturers Association (NEMA)
 - 10. National Fire Protection Association (NFPA)
 - 11. National Sanitation Foundation (NSF)
 - 12. Occupational Safety and Health Act (OSHA)
 - 13. Plumbing and Drainage Institute (PDI)
 - 14. Underwriters' Laboratory (UL)
 - 15. Requirements of local, state, and federal enforcing authorities codes and amendments to preceding codes shall be applicable to work performed under this specification.
 - 16. These Codes and Standards shall be considered to supersede the drawings. Include necessary sums for any work required by these codes.

1.03 PERMITS AND FEES

A. The Contractor shall take out all permits and arrange for all tests in connection with such work as required. All charges are to be included in the work. All charges or fees for service connections, meters, etc., shall be included in the work.

1.04 COORDINATION OF WORK

- A. Before starting any work, thoroughly examine all existing and newly completed underlying and adjoining work and conditions upon which the installation of this work is in any way dependent for the workmanship required by the Contract Documents. Report to the Architect and Engineer in writing any and all conditions which might adversely affect this work and limit ability to perform the required workmanship.
- B. Layout of materials, equipment and systems is generally diagrammatic unless specifically dimensioned. The actual locations of all materials, piping, ductwork, fixtures, equipment, supports, etc., shall be carefully planned, prior to installation of any work, to avoid all interference's with each other, or with structural, electrical or architectural elements.
- C. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Carefully investigate the mechanical, electrical, structural, architectural drawings and field conditions that could affect the work to be performed and arrange such work accordingly. Provide the required piping offsets, fittings, and accessories to meet such conditions.
- D. Spaces provided in the design of the building shall be utilized and the work shall be kept within walls or furring lines established on the drawings. Any discrepancy between Architectural or Fire Sprinkler drawings with respect to wall or furring locations and dimensions shall be brought to the Architect's attention for resolution before proceeding with installation.
- E. Any work which is done as an addition, expansion, or remodel of and existing system shall be compatible with that system.

1.05 DAMAGES BY LEAKS

A. The Contractor shall be responsible for damages caused by leaks in the temporary or permanent piping or mechanical systems prior to completion of work and during the period of the guarantee.

1.06 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 or asphaltic concrete required to accomplish the work under this Specification Division shall be provided under this Division. Restoration of all 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 Architect and Engineer.

1.07 EXCAVATION AND BACKFILLING

- A. Excavation and backfilling for work to be done under this Specification Section shall be done under this Section. All underground lines outside buildings shall be 2'-0" minimum backfill cover unless a greater depth of cover is recommended by the pipe manufacturer for the particular application. Width at top of pipe shall be 16" plus the outside width of pipe. Provide all shoring where required by site conditions.
- B. 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.
- C. Compaction. Compact to density of 90% within building and under walkways, driveways, traffic areas, paved areas, etc. Demonstrate proper compaction by testing at 8" above top of pipe. Perform test at every 100' of trench. If a test fails, the compaction shall be re-worked in both directions back to test points that passed, before re-testing.
- D. Electrical conduit shall not be run in excavations provided for mechanical systems.
- E. Excavation and backfilling in a public right-of-way shall be done in strict accordance with the agency having jurisdiction.

1.08 HANGERS AND SUPPORTS.

- A. Provide all hangers and supports for the proper installation of equipment and materials under this Section of the Specification.
- B. Any structural element required to properly hang, brace, or support piping, etc., and not shown on the Architectural or Structural Drawings shall be provided under this Specification Section. All black steel structural elements shall be painted with two coats of primer.
- C. Fire sprinkler pipes shall be braced per OSHPD Pre-Approval No. OPM-0052-13 the "Cooper B-Line / Tolco Restraint System". Copies of the above publication and details shall be provided by the Contractor and maintained at the project site until final acceptance.

1.09 CONTINUITY OF SERVICES

- A. All existing services and systems shall be maintained except for short intervals when connections are to be made. The contractor shall be responsible for any interruptions of services and shall repair damage done to any existing service caused by the work.
- B. If utilities not indicated on the drawings are uncovered during excavation, the Contractor shall notify the architect immediately for further instructions.

1.10 ELECTRICAL CONNECTIONS

- A. Provide under Specification Division 21 00 00 all required control conduit, wiring, controls and control panels as indicated on the drawings or as may be required for system operation.
- B. No control device shall be mounted with rigid connections on vibration isolated mechanical equipment. No field furnished control device shall be mounted on any piece of equipment so that it interferes with physical access of air or water flow, or covers any portions of nameplates or access doors.

1.11 FLASHING

A. Whenever any part of the Pipingl System(s) must penetrate the roof or outside wall, the openings shall be flashed and counter-flashed absolutely water tight with minimum 22 gauge galvanized sheet metal, prime coated. Flashing aprons shall extend not less than eight inches (8") from the pipe or supporting member in all directions unless detailed otherwise. All penetrations shall be flashed following the procedures of the National Roofing Contractor's Association.

1.12 PAINTING

A. Paint all black iron supports, hangers, anchors, etc., and all uninsulated black iron pipe work installed in weather exposed locations with one coat of rust resisting primer.

1.13 ACCESS DOORS AND PANELS

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 or as required to match wall construction. 16-gauge steel frame and 14-gauge steel panel with paintable finish, except in ceramic tile, where panel shall be 16-gauge stainless steel with satin finish. Continuous hinge. Screwdriver latch. Deliver panels to the General Contractor for installation. Provide Zurn Z-1460-4 for square doors and Z-1460-5 for rectangular doors, Karp, or equivalent. Unless otherwise noted , the minimum sizes shall be as follows:

1 valve up to 1-1/2"	12"x12"
1 valve up to 3"	16"x16"

1.14 SYSTEM IDENTIFICATION

A. Below Grade Piping. Bury a continuous, pre-printed, bright colored plastic ribbon marker with each underground pipe. Locate directly over buried pipe, 6" to 8" below grade

1.15 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, such as X-Tru-Coat or Scotchkote. All fittings and areas of damaged coating shall be covered with two layers of double wrap 10 mil polyvinyl tape to total thickness of 40 mils. Johns-Manville. Protective coating shall be extended 6" above surrounding grade.

1.16 **DEFINITIONS**

- A. Provide. The term "provide" as used in these specifications or on the Drawing shall mean furnish and install.
- B. Piping. The term "piping" as used in these Specifications or on the Drawings shall mean all pipe, fittings, nipples, valves, unions, hangers, and thermal insulation, etc., as may be required for a complete and functional system.
- C. Wiring. The term "wiring" shall include the provision of all necessary products which are required for a complete installation and shall include products such as conduit, electrical boxes, connections, transformers, relays and switches.

1.17 SUBMITTALS

A. Calculations

1. If other than a pipe schedule is to be provided, submit three (3) copies of supporting hydraulic calculations following procedures outlined in Specification section 15100, Submittals. The hydraulic calculation shall use no more than 90% of the available pressure at the connection to the sprinkler riser.

B. Shop Drawings

- Complete working shop drawings of the sprinkler system shall be submitted to the engineer prior to installation for preliminary review and comment. Subsequent to the engineer's initial review and before commencing with any work, forward six (6) sets of Sprinkler Drawings to the City of Bakersfield Building & Safety Department and obtain approval of the Shop Drawings from these agencies.
- 2. One (1) copy of the approved Sprinkler Plan shall be filed with the City of Bakerfield Building & Safety Department and two (2) copies returned to the engineer.
- 3. Shop Drawings shall indicate the location of the existing street main water supply (including pressure and flow rate), system riser with the number of sprinkler heads served, distribution mains, effect of existing sprinkler system, etc.

1.18 **TESTS**

A. All testing shall be done in accordance with NFPA Standard 13 and under the observation of an inspector from the authority having jurisdiction. Work to be concealed shall not be enclosed until prescribed tests are satisfactorily completed and accepted.

1.19 PROJECT CLOSE-OUT

- A. Record Drawings
 - 1. Provide in accordance with general conditions of the specifications.
- B. Operation and Maintenance Manual
 - 1. Provide three (3) copies of Operation and Maintenance Manuals to the Engineer for review and acceptance. Provide the Owner's designated representative with one copy of the approved O & M manual.

2. Bind Operation and Maintenance Manuals for each Mechanical System (Plumbing, Air Conditioning, etc.) in a hard-backed binder. Cover of each binder shall have the following lettering:

OPERATION AND MAINTENANCE MANUAL M.O.T. BUILDING FAIRFAX SCHOOL DISTRICT BAKERSFIELD, CALIFORNIA

- 3. Provide a master index at the beginning of Manual showing items included. Use plastic tab indexes for the sections of the Manual. Provide a sub-section with manufacturer's descriptive literature for each item of installed equipment with model, capacities, and all other pertinent information highlighted.
- C. Maintenance Instructions. Provide:
 - 1. Summary list of equipment used indicating name, model and nameplate date of each item together with number and name associated with each system item.
 - Manufacturer's maintenance instructions for each piece of equipment installed in project. Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment and maintenance and lubrication instructions.
- D. Section 5, Warranties. Provide:
 - 1. A copy of each manufacturer's warranty statement, completely filled out and indicating date forwarded to the respective manufacturer.

PART 2 MATERIALS

2.01 PIPE AND FITTINGS

- A. Outside Building to 5'-0" from Building Wall (under ground).
 - 1. Class 150 polyvinyl chloride (PVC) pressure pipe with integral bell and spigot joints with an elastomeric ring, meeting the requirements of AWWA C900, DR18, and shall be listed and approved by Underwriters Laboratories and Factory Mutual, respectively. Sealing ring shall comply with the requirements of ASTM D-1896 and E-477.
- B. From 5'-0" Outside Building (underground) to Inside Building +6" Above Floor at Riser.
 - 1. Ductile iron, AWWA C151, 150 PSIG, bituminous coated exterior. Provided flanged anchors connected to interior piping.

- C. Inside Building From 6" Above Floor
 - 1. 2" & smaller Pipe Size: Schedule 40 black steel ASTM A53 or A120. Joints shall be threaded malleable iron, ANSI B16.3, Class 125.
 - 2-1/2" & Larger Pipe Size: Schedule 10 black steel pipe, ASTM A135. Joints shall be UL and FM approved mechanical couplings and shall not be welded. Couplings may be of the bolted rolled groove type or the mechanical locking push-on type. Groves for the rolled grooves type shall be rolled only. Pipe end preparations for the mechanical coupling shall be as follows.
 - a) Group components shall be of one manufacturer.
 - b) Utilized grooving tools shall be acceptable to fitting manufacturer and shall be limited to Victaulic, Ridge Tool Company, or Pace without substitution.

2.02 PIPING PROTECTIVE WRAP

- A. All steel piping buried below shall be factory coated with "Scotchkote" 101 epoxy resin as manufactured by 3-M Company, or "X-Tru-Coat" as Manufactured by Pipe-Line service Corp. Field joints shall be wrapped with "Scotchwrap" #50 or coated with "Scotchkote" 302.
- B. Provide a continuous test of all pipe covering, including field joints, prior to backfilling. This test shall be made using a "Holiday Detector" as manufactured by Tinker and Rascor Co., or approved equal. Test at an electrical voltage of 10,000 volts D.C.. Any wrap holiday found shall be patched and retested. This test shall be done in the presence of the owner's inspector.

2.03 VALVES

- A. Control Valves for Sprinkler Systems
 - 1. Solid wedge gate, rising stem, O.S.&Y., 175 psi w.p., U.L. Listed, provided with tamper switches.
- B. Globe Valves
 - 1. Bronze union bonnet, renewable composition disc, 175 psi w.p., U.L. Listed, provided with tamper switches.
- C. Check Valves
 - 1. 2" and Smaller: All bronze swing check. 175 psig WOG. U.L. Listed
 - 2. 2-1/2" and Larger: Iron body, bronze mounted swing check. 175 psig WOG. U.L. Listed

- D. Gate Valves
 - 1. 2" and Smaller: All bronze, rising stem. 200 psi WOG. U.L. Listed, provided with tamper switches.
 - 2-1/2" and Larger: Iron Body, bronze mounted, outside screw and yoke.
 175 psi WOG. U.L. Listed. (U.L. Listed butterfly valves may be substituted for 4" and larger gate valves). Provide with tamper switch.

2.04 SPRINKLER HEADS

- A. Automatic spray sprinkler heads of suitable operating temperature shall be provided.
- B. Up-right, pendant, or flush type shall be provided, as required.
- C. In all areas with ceilings such as offices, work rooms, and corridors, etc., provide flush type heads. Heads installed in areas with finished ceilings shall have metal escutcheons with same finish as heads (Chrome Plated).
- D. Provide side wall heads where indicated on the drawing or required by job condition. Escutcheons for side wall heads shall have finish to match color of wall.
- E. Temperature ratings shall be in accordance with NFPA Pamphlet 13. Heads shall have chrome finish in areas with finished ceilings, standard finish in areas with exposed piping, lead coating on outdoor areas.
- F. Heads installed lower than eight feet above the floor shall have wire guards.
- G. Provide extra heads (of each type installed) in accordance with code requirements.

2.05 TEST AND DRAIN CONNECTION

A. Install horizontal piping graded to low points and in a manner to make it possible to test and empty the entire system. Provide valves and piping of size as approved on accordance with NFPA Pamphlet 13.

PART 3 INSTALLATION

3.01 GENERAL

A. The Sprinkler Drawings are schematic and indicate generally the system and equipment to be used. Architectural and structural conditions or drawings and existing conditions shall govern the exact location for all piping and sprinkler heads. Lay out and coordinate the sprinkler work with the work of other trades and confirm the locations of and install sleeves and hangers so that

work of other trades is not impeded. Care shall be taken to secure best possible head room in location of sprinkler heads. Coordinate installation of sprinkler piping to avoid interference with adjacent air conditioning, plumbing, etc. Sprinkler piping must clear all overhead equipment.

- B. All sprinkler heads shall be located on center-line of, corridor, light fixtures, air conditioning outlets ceiling panels as generally indicated and whenever possible to present a neat organized appearance.
- C. Fire caulk all piping penetrations per a U.L. approved caulking assembly, at all piping penetrations of walls aand floors.

3.02 PIPING

- A. All piping shall be seismically braced and shall be done on compliance with NFPA 13, latest edition.
- B. Run in line with the building walls. Turns and bends shall be made with standard fittings.
- C. On branch line piping, provide at least one hanger between every two sprinkler heads and a maximum of 12' apart. End Sprinklers more than thirty inches (30") from any hanger shall be supported by a hanger not less than 12" from the sprinkler head.

3.03 SLEEVES

- A. Non-Rated Assemblies
 - Sleeves for pipe passing through concrete floors or walls shall be schedule 40 galvanized steel pipe of size sufficient to permit the pipes to pass through with a minimum clearance of 1" between sleeves and pipe for pipe up to 3-1/2" and 2" clearance for pipe larger than 4". Sleeves shall have square ends cut flush with surface and shall be caulked tight. Sleeves through floors shall extend 1" above finished floor surface.
- B. Rated Assemblies
 - Same as for non-rated assemblies except that sleeves shall be packed for its entire length with UL listed system three hour classification such as a 3M FireDam 160 caulk at ends and mineral wool batt material stuffer in middle of penetration.

3.04 ESCUTCHEONS

A. Chrome plated, brass. Crane, with set screw.

3.05 DRAINAGE OF SYSTEM

A. All sprinkler pipe and fittings shall be installed so that the sprinkler system can be completed drained. Piped shall be pitched at 1/4" per foot.

3.06 FLUSHING CONNECTION

A. Shall be installed on the sprinkler system where necessary.

3.07 VALVE SUPPORTS

A. All piping carrying fire valves shall be securely fastened to the building structure and each valve to prevent movement of valves because of manual pressure to the valves.

3.08 CLEANING

A. All cement, plaster, etc., shall be removed with an approved solvent. All foreign mater shall be thoroughly flushed from inside if pipes before fabrication.

3.09 **TESTS**

- A. <u>General</u>: At various stages and upon completion the system shall be tested in the presence of a representative of the enforcing authority.
- B. Tests Shall Include
 - 1. Flushing Test in accordance with NFPA 13, Paragraph 8-2.1.
 - 2. Hydrostatic Test in accordance with NFPA 13. Paragraph 8-2.2.
 - 3. System Operational Tests in accordance with NFPA 13, Paragraph 8-2.4.

3.10 CERTIFICATION

- A. At the completion of the installation a certificate of inspection from the authority having jurisdiction indicating that the installation and testing is in accordance with reference standards, shall be delivered to the owner.
- B. Along with the certificate of inspection furnish the owner with a copy of NFPA Pamphlet 13A, Care and Maintenance of Sprinkler Systems. Also provide a copy of Title 19, California Code of Regulations, Article 4, Maintenance and Service, Paragraphs 904.1 and 904.2.

END OF SECTION 21 00 00

PLUMBING SECTION 22 00 00

PART 1 GENERAL

1.01 GENERAL PROVISIONS

A. General Provisions of the contract including General and Supplementary Conditions apply to the work specified in this Section.

1.02 SCOPE.

- A. Work 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. A complete system of sanitary soil, waste and vent piping including connection to site utility, waste, and drain connections to all fixtures and equipment.
 - 2. A complete system of hot and cold water piping including connection to site utility and connections to fixtures and equipment.
 - 3. Condensate drains from air conditioning units.
 - 4. Furnishing, mounting and final connections to fixtures and equipment as shown or scheduled on the plumbing and architectural drawings that is part of any system listed above.
 - 5. Final connections to equipment provided in other sections of these specifications or indicated as furnished by owner and installed by the contractor.
 - 6. Acceptance testing as required under California Building Energy Efficiency Standards, Title 24.
 - Coordination with acceptance testing technician (ATT) and / or commissioning agent. Acceptance testing and / or commissioning required where noted in construction documents or per code requirements.

1.03 CODES AND STANDARDS

A. All work and materials shall conform 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.

- 1. Applicable codes and standards shall include but are not necessarily limited to:
 - a. California Code Of Regulations:
 - 1) Title 8, Industrial Relations
 - 2) Title 17, Public Health
 - 3) Title 19, Public Safety
 - 4) Title 21, Public Works
 - 5) Title 24, Energy Regulations
 - b. California Building Code.
 - c. California Mechanical Code
 - d. California Plumbing Code
 - e. American Society for Testing and Materials (ASTM)
 - f. American Water Works Association (AWWA)
 - g. Cast Iron Soil Pipe Institute (CISPI)
 - h. California Electrical Code (CEC)
 - i. National Electrical Manufacturers Association (NEMA)
 - j. National Fire Protection Association (NFPA)
 - k. National Sanitation Foundation (NSF)
 - I. Occupational Safety and Health Act (OSHA)
 - m. Plumbing and Drainage Institute (PDI)
 - n. Americans with Disabilities Act. Accessibility Guidelines for Buildings and Facilities. (ADAAG).

1.04 PERMITS AND FEES

A. The Contractor shall take out all permits and arrange for all tests in connection with such work as required. All charges are to be included in the work. All charges or fees for service connections, meters, etc., shall be included in the work.

1.05 COORDINATION OF WORK

- A. Before starting any work, thoroughly examine all existing and newly completed underlying and adjoining work and conditions upon which the installation of this work is in any way dependent for the workmanship required by the Contract Documents. Report to the Architect and Engineer in writing any and all conditions which might adversely affect this work and limit ability to perform the required workmanship.
- B. Layout of materials, equipment and systems is generally diagrammatic unless specifically dimensioned. The actual locations of all materials, piping, ductwork, fixtures, equipment, supports, etc., shall be carefully planned, prior to installation of any work, to avoid all interference's with each other, or with structural, electrical or architectural elements. Verify the proper voltage and phase of all equipment with the electrical plans. All conflicts shall be called to the attention of the Engineer prior to the installation of any work or the ordering of any equipment.

- C. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Carefully investigate the mechanical, electrical, structural, architectural drawings and field conditions that could affect the work to be performed and arrange such work accordingly. Provide the required piping and ductwork offsets, fittings, and accessories to meet such conditions.
- D. Spaces provided in the design of the building shall be utilized and the work shall be kept within walls or furring lines established on the drawings. Any discrepancy between Architectural or Mechanical drawings with respect to wall or furring locations and dimensions shall be brought to the Architect's attention for resolution before proceeding with installation.
- E. Any work which is done as an addition, expansion, or remodel of and existing system shall be compatible with that system

1.06 MANUFACTURER'S RECOMMENDATIONS

A. All material, equipment, and devices, etc., shall be installed in a manner meeting approval of the manufacturer of the particular item. The Contractor shall make himself available of all installation manuals, brochures, and procedures that the manufacturer issues for the equipment and material. Contractor shall be held responsible for all installations contrary to the manufacturer's recommendations. Contractor shall make all necessary changes and revisions to achieve such compliance.

1.07 GUARANTEE

A. Guarantee shall be in accordance with the General Conditions. 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.

1.08 QUIETNESS

A. Piping of all types, ductwork, and equipment shall be arranged and supported so that the vibration is at a minimum and is not transmitted to the building structure.

1.09 DAMAGES BY LEAKS

A. The Contractor shall be responsible for damages caused by leaks in the temporary or permanent piping or mechanical systems prior to completion of work and during the period of the guarantee.

1.10 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. Any item omitted from the submittal shall be provided as specified without substitution. All shop drawings must comply with the following:
 - 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 contract documents. Descriptive literature shall be current manufacturer's brochures and submittal sheets.
 - 2. All shop drawings shall be submitted at one time in a three hole binder with title sheet including Project Title, Architect, Engineer, 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 the are proposed. All equipment shall also be identified by the mark number as indicated on drawings. Submittals shall bear the stamp of certification by the Contractor as evidence that the Contract Documents (Specifications and Drawings) have been thoroughly checked.
 - 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. 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. Unless otherwise noted, alternate manufacturers may be submitted for review by the Engineer. 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. No more than one submittal will be considered on a proposed alternate for any item.

- 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.
 - 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. Submittals for products and equipment offered as an alternate to that specified will require, if accepted by the Engineer, resubmission of the Title 24 Energy Compliance Calculations if the specified product or equipment was included within the scope of the approved calculations on file with the reviewing authority. The cost of preparing resubmission will be the responsibility of the Contractor.

1.11 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 or asphaltic concrete required to accomplish the work under this Specification Division shall be provided under this Division. Restoration of all 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 Architect and Engineer.

1.12 EXCAVATION AND BACKFILLING

A. Excavation and backfilling for work to be done under this Specification Section shall be done under this Section. All underground lines outside buildings shall be 2'-0" minimum backfill cover unless a greater depth of cover is recommended by the pipe manufacturer for the particular application. Width at top of pipe shall be 16" plus the outside width of pipe. Provide all shoring where required by site conditions.

- B. 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.
- C. 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 8" above top of pipe. Perform test at every 100' of trench. If a test fails, the compaction shall be re-worked in both directions back to test points that passed, before re-testing.
- D. Electrical conduit shall not be run in excavations provided for mechanical systems.
- E. Excavation and backfilling in a public right-of-way shall be done in strict accordance with the agency having jurisdiction.

1.13 HANGERS AND SUPPORTS.

- A. Provide all hangers, bracing, and supports for the proper installation of equipment and materials under this Section of the Specification.
- B. Any structural element required to properly hang or support piping, ducts, or equipment, etc., provided under this Specification Section and not shown on the Architectural or Structural Drawings shall be provided under this Specification Section.
- C. All plumbing piping shall be supported and seismically braced to prevent contact with other building elements or components during a seismic event.

1.14 FLASHING

A. Whenever any part of the Mechanical System(s) must penetrate the roof or outside wall, the openings shall be flashed and counter-flashed absolutely water tight with minimum 22 gauge galvanized sheet metal, prime coated. Flashing aprons shall extend not less than eight inches (8") from the duct, pipe, or supporting member in all directions unless detailed otherwise. All penetrations shall be flashed following the procedures of the National Roofing Contractor's Association

1.15 PAINTING

A. Paint all black iron supports, hangers, anchors, etc., and all uninsulated black iron pipe work installed in weather exposed locations with one coat of rust resisting primer.

1.16 CONTINUITY OF SERVICES

- A. All existing services and systems shall be maintained except for short intervals when connections are to be made. The contractor shall be responsible for any interruptions of services and shall repair damage done to any existing service caused by the work.
- B. If utilities not indicated on the drawings are uncovered during excavation, the Contractor shall notify the architect immediately for further instructions.

1.17 ELECTRICAL CONNECTIONS

- A. Provide under Specification Division 22 00 00 all required control conduit, wiring, controls and control panels as indicated on the drawings or as may be required for system operation.
- B. No control device shall be mounted with rigid connections on vibration isolated mechanical equipment. No field furnished control device shall be mounted on any piece of equipment so that it interferes with physical access of air or water flow, or covers any portions of nameplates or access doors.

1.18 MOTORS.

A. Shall be selected for quiet operation, voltage, and rpm to match the project electrical characteristics. Motors shall be open, drip-proof, normal torque and weatherproofed where indicated or required. Motors shall be of the NEMA premium efficiency type.

1.19 ELECTRICAL COORDINATION

A. Prior to commencing construction arrange a conference with the electrical and mechanical trades as well as equipment suppliers and verify types, sizes, locations, voltage requirements, controls and diagrams of all equipment furnished by them. In writing, inform the Architect that all phases of coordination of this equipment have been covered and if there are any unusual conditions or problems they shall be enumerated at this time.

1.20 DEFINITIONS

A. Provide. The term "provide" as used in these specifications or on the Drawing shall mean furnish and install.

- B. Piping. The term "piping" as used in these Specifications or on the Drawings shall mean all pipe, fittings, nipples, valves, unions, hangers, and thermal insulation, etc., as may be required for a complete and functional system.
- C. Wiring. The term "wiring" shall include the provision of all necessary products which are required for a complete installation and shall include products such as conduit, electrical boxes, connections, transformers, relays and switches.

1.21 PAINTING

A. Paint all black iron supports, hangers, anchors, etc., and all uninsulated black iron pipe work installed in weather exposed locations with one coat of rust resisting primer.

1.22 ACCESS DOORS AND PANELS

- 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 or as required to match wall construction. 16-gauge steel frame and 14-gauge steel panel with paintable finish, except in ceramic tile, where panel shall be 16-gauge stainless steel with satin finish. Continuous hinge. Screwdriver latch. Deliver panels to the General Contractor for installation. Provide Zurn Z-1460-4 for square doors and Z-1460-5 for rectangular doors, Karp, or equivalent. Unless otherwise noted , the minimum sizes shall be as follows:
 - 1. 1 valve up to 1-1/2" 12"x12"
 - 2. 1 valve up to 3" 16"x16"

1.23 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, by stenciled marking or decals, and include arrows to indicated direction of flow. Locate markers at end 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 of equipment connections are not required. Decals pasted, glued, or adhered to piping or insulation shall be Seton "Setmark", or equivalent. Decals or stencils shall be applied after the painting of all piping systems is complete and after preliminary acceptance of piping system. Decals and stencils shall comply with ANSI and OSHA specifications with respect to marker size, color, and legend.

- B. Below Grade Piping. Bury a continuous, pre-printed, bright colored plastic ribbon marker with each underground pipe. Locate directly over buried pipe, 6" to 8" below grade
- C. Equipment. All equipment shall be identified with a plastic laminated engraved nameplate which bears the unit number marked as indicated on the drawings (e.g. AC-4, WH-1) Provide 1/2" high lettering white on black background. Nameplates shall be permanently secured to the unit.

1.24 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, such as X-Tru-Coat or Scotchkote. All fittings and areas of damaged coating shall be covered with two layers of double wrap 10 mil polyvinyl tape to total thickness of 40 mils. Johns-Manville. Protective coating shall be extended 6" above surrounding grade.

1.25 CONCRETE ANCHORS

A. Steel bolt with expansion anchor requiring a drilled hole - powder driven anchors are not acceptable. Minimum concrete embedment shall be 4½ diameters. Minimum spacing shall be 10 diameters center to center and 5 diameters center to edge of concrete. Maximum capacity shall be determined in compliance with ACI 318-19, Chapter 17 and the anchor's engineering evaluation report. Hilti, Phillips. Wej-it. Exterior locations shall utilize stainless steel hardware.

1.26 PROJECT CLOSE-OUT

- A. Record Drawings
 - 1. Provide in accordance with general conditions of the specifications.
- B. Operation and Maintenance Manual for Mechanical Systems
 - Provide three (3) copies of Operation and Maintenance Manuals to the Engineer for review and acceptance. Provide the Owner's designated representative with one copy of the approved O & M manual. Bind Operation and Maintenance Manuals for each Mechanical System (Plumbing, Air Conditioning, etc.) in a hard-backed binder. Cover of each binder shall have the following lettering:

OPERATION AND MAINTENANCE MANUAL M.O.T. BUILDING FAIRFAX SCHOOL DISTRICT BAKERSFIELD, CALIFORNIA Provide a transmittal letter at the beginning of the manual on the Contractor's letterhead. Letter shall be signed by a contractor principal (Owner or Corporate Officer) and shall be countersigned by the Owner's designated representative and shall indicate the date when the mechanical systems were shown and explained in detail to the Owner's designated representative. (The Engineers office shall be notified 48 hours minimum prior to the owner-contractor meeting.)

Provide a master index at the beginning of Manual showing items included. Use plastic tab indexes for the sections of the Manual.

Section 1, General. Provide:

- Name of Architect, Mechanical Engineer, Contractor and Mechanical Sub-Contractor.
- A complete list of installed equipment with project mark number, indicating name of vendor, address and phone number.
- A sub-section with manufacturer's descriptive literature for each item of installed equipment with model, capacities, and all other pertinent information highlighted.

Section 2, Operating instructions. Provide:

- General description of each separate system and sub-system.
- Step by step procedure to follow in putting each piece of mechanical equipment into operation. Start-up sheets must be signed by the owner of the installing contractor certifying that the start-up has been completed per manufacturer's written instruction.
- Schematic as-built control diagrams for each separate system. Diagrams shall bear the date of the acceptance of the project. Include all temperature control panels and their respective functions.

Section 3, Maintenance Instructions. Provide:

- Summary list of mechanical equipment used indicating name, model, serial number, and nameplate date of each item together with number and name associated with each system item.
- Manufacturer's maintenance instructions for each piece of mechanical equipment installed in project. Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment and maintenance and lubrication instructions.

Section 4, Warranties. Provide:

• A copy of each manufacturer's warranty statement, completely filled out and indicating date forwarded to the respective manufacturer.

PART 2 MATERIALS

2.01 PIPING

- A. General
 - 1. All material shall be in conformance with current specifications of American Society of Testing Materials (ASTM) and CPC 301.2.
- B. Domestic Cold Water
 - 1. Inside Building, Above Grade or Slab
 - a. Type "L" hard drawn copper tubing with wrought copper solder joint fittings, NIBCO, ANACONDA, or acceptable equivalent. Joints shall be made with 95.5 solder, such as Silavoy Streamline 122, Silvabrite 100 or acceptable "lead free" equivalent. Pipe to be reamed to full bore, de-burred, and joint area cleaned with a Trisodiumphosphate solution prior to joining.
 - b. Where allowed under local and state building codes: Viega Pro-Press pipe joining system for copper piping.
 - 2. Outside Building, Below Grade, Slab, and Paved Areas.
 - a. Schedule 40 galvanized steel with galvanized malleable iron banded 150 lb. fittings. Pipe shall be protected as specified elsewhere in this section.
 - b. Polyvinylchloride (PVC) pressure rated Schedule 40, ASTM D 2241, with rubber rings, ASTM D 1869. Piping shall be equivalent to Johns-Manville "Ring-Tite" and shall be installed in strict compliance with Manufacturer's Installation Guide. Where sizes shown are smaller than those available with "Ring-Tite" pipe, use schedule 80 PVC glued pipe and fittings. Piping option only where local codes allow its use.
 - c. Type "K" hard drawn. All else per copper specification above.
- C. Domestic Hot Water.
 - 1. Inside Building, Above grade or slab
 - a. Same as Cold Water Piping Inside Building.
- D. Soil Waste and Vent Piping
 - 1. Inside Building and Within 5 Feet of Building Wall
 - a. Coated standard weight cast iron pipe and fittings, CISPI Standard 301 and ASTM A-888. Joints shall be ABI "No-Hub" stainless steel band, mechanically assembled (no welds), conforming to ASTM C564.
 - b. Vent piping and waste piping above floor 2-1/2" diameter maximum may be standard weight galvanized steel pipe.
 - 2. Outside Building
 - a. Johns-Manville ring-tite, or equivalent, polyvinylchloride (PVC) gravity pipe, where permitted by local codes, complying with ASTM 03034-SDR 35 with joints using flexible elastomeric seals meeting requirements of ASTM D-3212.

- E. Condensate Drains
 - 1. Type "L" hard drawn copper tubing with wrought copper solder joint fittings. All changes in direction of condensate drain shall be accomplished with plugged tees. Drains shall be extended as indicated on drawings or to nearest acceptable fixture or vent if not indicated.
- F. Piping Protective Wrap
 - All galvanized or black steel piping buried below grade shall be factory coated with Scotchkote 101 Epoxy Resin as manufactured by 3M Company, or "X-tru-Coat" as manufactured by Pipe Line Service Corp. Field joints shall be wrapped by Scotchrap #50 or coated with Scotchkote 302 as recommended by manufacturer. In lieu of above, pipe may be machine-wrapped with Scotchrap #51. 50% lapped with joints per above.
 - 2. Provide a continuous test of all pipe covering, including field joints, prior to backfilling. This test shall be made using a "Holiday Detector" as manufactured by Tinker and Rascor Co., or approved equal. Test at an electrical voltage of 10,000 volts D.C.. Any wrap holiday found shall be patched and retested. This test shall be done in the presence of the owner's inspector
- G. Concrete Thrust Blocks
 - 1. Shall be constructed at all valves, tees, elbows, bands, crosses, reducers and dead ends in loose-joint pipe. Blocks shall cure a minimum of 7 days before pressure is applied. Concrete shall be 2000 psi min.
- H. Compressed Air
 - 1. Standard weight, galvanized steel, Schedule 40, with galvanized malleable iron banded 150 lb. fittings. Final connection to apparatus shall be of material and method as recommended by manufacturer
- I. Exposed Pipe at Fixtures
 - 1. Chrome plated red brass pipe, iron pipe size, with threaded cast bronze chromium plated couplings and fittings. Any pipe required to extend from finish wall into exposed view within Toilet Rooms shall be chrome plated.

2.02 VALVES

- A. General
 - Manufacturer's model numbers are listed to complete description. Equivalent models of Crane, Grinnell, Nibco, or Stockham are acceptable. Use ball valves for 1-1/2" and smaller domestic hot and cold water, and gate valves for 2" and larger size.
- B. Gate Valve
 - 1. 2" and Smaller. All bronze, Malleable iron hand wheel, Rising stem, Union bonnet, Wedge disc, 200 psi WOG, Stockham B-105.
- 2-1/2" and Larger. Iron body, bronze mounted, Non-rising stem, Wedge disc, 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.
- C. Check Valves
 - 1. 2" and Smaller. All bronze swing check, regrinding. 200 psi WOG. Stockham B-319.
 - 2. 2-1/2" and Larger. Swing check, iron body, brass mounted seats, Class 125. Stockham G-931.
- D. Ball Valve.
 - Bronze body, cap, stem, disk and ball. Screwed connection. Lever handleTFE seat. O-ring seals. 600 psi WOG. Consolidated Brass "Apollo", Grinnell,

2.03 INSULATION

- A. General
 - 1. All insulation shall comply with the requirements per the California Building energy Efficiecny standards, Title 24. Refer to Table 120.3-A, Pipe Insulation Thickness
 - 2. All insulation shall be provided in accordance with the "National Insulation Contractors Association" manuals. Insulation shall be applied by a contractor holding a valid California C-2 License.
 - 3. All insulation jackets and lapseal adhesives shall be tested as a composite product in accordance with ASTM E 84, Class A and shall have a flame spread of not more than 25 and a smoke developed rating of not more than 50.
 - 4. All domestic hot water piping, fittings and accessories shall be insulated. All circulating piping shall be insulated. Cold water piping in ventilated attic shall be insulated.
- B. Interior Piping, Fittings and Valves
 - Shall be insulated with 1" thick Fiberglass ASJ/SSL U.L. rated pipe insulation through 1" diameter pipe, 1-1/2" thick for 1-1/4" diameter pipe and above. Fittings shall be hard molded plastic flush. Do not insulate flanges or valves unless water temperature exceeds 140°F or the piping is exposed to weather.

- C. Piping Exposed to Weather or View
 - All piping and fittings exposed to weather shall have, in addition to the above-described insulation, aluminum jacketing. 0.016" thickness for straight pipe. 0.024" thickness for fittings. Integral moisture barrier. Provide pre-fabricated aluminum strapping and seals by same manufacturer, "Childers" or equal. Secure in place with factory supplied straps. Install all joints to prevent water entry. All joints shall be sealed with outdoor mastic. Benjamin Foster 65-07 or equal.
 - 2. For Miscellaneous fittings for which aluminum jackets are not available or where proximity of fittings precludes a neat-appearing installation, the Contractor may cover the insulation with stretchable glass fabric and at least two coats of outdoor mastic.
 - 3. Additional Finish for Exposed Piping and Equipment: All piping and equipment exposed to view but protected from the weather such as in equipment rooms shall be given an additional finish of PVC jackets.
- D. Hot Water Supply/Drain Piping and Handicap Fixtures "Handi Lav-Guard" insulating kits by Truebro, Inc.. or "Trap Wrap" as manufactured by Brocar Industries. Pre-formed insulation and materials to cover hot water, cold water, and drain piping. Must conform to ADA and California codes. Pressure sensitive expanded poly foam tape will not be accepted.

2.04 CLEANOUTS

- A. Style shall be ZURN as follows (equivalent models of Smith are acceptable):
 - 1. For vinyl tile use #ZN-1400-6
 - 2. For carpeted areas use #ZN-1400-14
 - 3. For terrazzo areas use #ZN-1400-10
 - 4. For ceramic tile or finished concrete use #ZN-1420-2
 - 5. Grade cleanouts (Non-Traffic areas) use #ZN-1400-25
 - 6. Grade cleanouts (Traffic areas) use #ZN-146-15W/Z-1450-8
 - 7. For wall cleanouts use #ZN-1460-8
- B. Cleanout Box.
 - 1. Precast reinforced concrete. Cast iron lid marked for service.

2.05 FIXTURES AND TRIM

- A. General
 - Provide Rough-in for and install all plumbing fixtures shown on drawings. All trim not concealed shall be brass with polished chrome plate finish unless noted otherwise. Waste shall be chrome plated 17 gauge P-trap shall have clean-out and escutcheon at tailpiece. All enameled fixtures to be acid resisting. Standard color is white unless otherwise noted.
 - 2. All drinking water faucet products shall be certified to NSF Standard 61 section 9 Drinking Water Components. The brass casting shall contain no more than two tenths of one percent lead by dry weight.

- 3. Other brass components which contact water within the faucet shall be from brass which contains no more than three percent lead by dry weight. All faucets exempt from NSF Standard 61 Section 9 shall meet the same lead content criteria.
- B. Supplies
 - 1. Standard compression stop, straight pattern, loose key, chromium plated with stuffing box.
 - 2. All exposed fixture supplies to lavatories, sink-sand water closets shall be Brass-Craft "Speedway" flexible supplies with metal compression ring connection at all stops or fittings as designated by part number, and shall have a rigid metal to metal connection to fixture valves. For lavatories & sinks use STR 1715A and for tank-type water closets use STR 1712DL.
- C. Air Chambers
 - Zurn Z-1700 "Shoktrol" complete with shut-off valve on branch to air chamber and screwdriver stop stainless steel access panel. Provide where noted on drawings and upstream at every quick-closing manual, solenoid or flush valve. Install per manufacturers instructions locating chamber between the last two fixtures on a 20' or shorter header, or use (2) chambers (calculated for the total fixture unit count)for headers over 20' in length with locations in the middle and between the last two fixtures on the header.

2.06 BACKFLOW PREVENTERS

- A. General
 - 1. Backflow preventers shall be provided on building domestic water service as may be required by the local utility and shall also be provided in all branch lines serving any new or existing boiler, cooling tower, evap. condenser or other device requiring chemical water treatment.
- B. Reduced Pressure Type: Two spring loaded "Y" pattern check valves, differential relief valve mechanism, inlet and outlet shut-off valves, and four test clocks. Approved by AWWA. Febco, Beeco, or equivalent.
- C. Double Check Type: Two spring loaded "Y" pattern check valves, inlet and outlet shut-off valves, and four test clocks. Approved by AWWA. Febco, Beeco, or equivalent.
- D. Pressure Type Vacuum Breaker: Spring loaded check valve assembly, air inlet port and poppet, inlet and outlet shut-off valves, and two test cocks. Febco, Beeco or equivalent.

E. Domestic Water Heater Expansion Tank: Provide expansion tank on cold water supply to any water heater if backflow prevention is required at site water connection. "Amtrol" ST series sized per manufacturer's recommendations.

2.07 STRAINERS

A. Threaded strainers are to be of the gasketed capped cover extra heavy iron body type - Similar to Mueller Fig. #11. Provide gate valve and pipe nipple with 3/4" hose connection on each strainer for blow-off.

2.08 FLOOR, CEILING, AND WALL PLATES

A. Beaton and Cadwell No. 10, steel flange with locking device and polished chromium plated finish. Provide plates on any finished surface through which pipe passes.

2.09 INSULATING FITTING

A. Epco dielectric unions with Epconite insulating gasket selected for applicable duty. Provide wherever pipes of different metals are joined.

2.10 PIPE MARKERS

A. One inch (1") high minimum, stenciled letters, located every 6'-0". Markers shall indicate piping service such as domestic cold water supply, etc., and shall have directional flow arrow at each location of stenciled letters. Decals pasted, glued, or adhered to piping or insulation are not acceptable unless decal wraps entirely around pipe or insulation such as Seton "Set mark", or equivalent. Decals shall be applied after painting of all piping systems is complete and after preliminary acceptance of piping system. Decals shall comply with ANSI and OSHA specifications with respect to marker size, color, and legend

2.11 UNION

A. 2" and smaller - AAR malleable iron, bronze to iron ground seat. 30 psi. Size 2-1/2" and larger - Grooved pipe, synthetic gasket, malleable iron housing. Victaulic Style 77, Type "E" gasket, Grinnell.

2.12 PIPE HANGERS AND SUPPORTS

- A. General
 - 1. All plumbing piping shall be supported and seismically braced to prevent contact with other building elements or components during a seismic event.

- B. Steel pipe and Cast Iron Soil Pipe
 - 1. 1/2" through 4" pipe. Provide B-line B3690 J-style hanger, with standard electro-plated finish.
 - 2. 5" and larger pipe. B-line B3100 Clevis-Style pipe hanger with standard electro-plated finish.
- C. Copper Tubing
 - 1. Provide B-line B3690F felt-lined hanger for copper tubing with standard electro-plated finish.
- D. Insulated Pipe & Tubing
 - 1. Provide B-line B3380 thru B3384 360° calcium silicate shield. The hanger and shield shall be fitted to the outside of the pipe insulation.
- E. Cast Iron Pressure Piping
 - 1. Provide B-line B3102 Clevis-Type hangers sized for water works piping.
- F. Hanger Rod Sizing
 - 1. Hanger rods shall be roll threaded mild steel with electro-galvanized finish and shall meet or exceed the following table:

Piping or Tubing Size	Hanger Rod Size
1/2" through 2"	3/8"
2-1/2" through 5"	1/2"
6" through 10"	5/8"

- G. Hanger Spacing
 - Provide at least one hanger per branch and independently support all linemounted equipment. Provide a hanger within 12" of elbow at riser or drop. Spacing of hangers along the run of the pipe shall not exceed the following table:

Pipe or Tubing Size	Steel Pipe	Copper Tube	CI Pipe	
1/2" through 3/4"	7'-0"	5'-0"	5'-0"	
1" through 1-1/4"	7'-0"	6'-0"	5'-0"	
1-1/2" through larger	10'-0"	10'-0"	5'-0"	

H. Structure Attachments

- 1. General
 - a. Shall be engineered to support the intended design load and shall be sized for the hanger rod specified.
 - b. For attaching to steel channels, use B-line beam clamp threaded anchor hook.

- I. Trapeze Hangers
 - Trapeze hangers shall be fabricated from galvanized channel. Stress on the installed channel shall not exceed 25,000 psi. Deflection on the installed channel shall not be greater than 1/240th of the span length. For load calculations, all piping to be assumed to be water-filled unless handling a heavier liquid. Hanger rods for trapeze hangers shall be limited to 9,000 psi stress based on the area at the root of the threads. Minimum hanger rod size shall be 3/8"
- J. Riser Clamps
 - 1. B-Line B3373 plain finish for interiors, galvanized for exterior. Provide on vertical piping at each floor.

2.13 SLEEVES

- A. Non-Rated Assemblies: Sleeves for pipe passing through concrete floors or walls shall be Schedule 40 galvanized steel pipe of size sufficient to permit the pipes to pass through with a minimum clearance of 1/2" between sleeve and pipe. Sleeves shall have square ends cut flush with surface and shall be caulked tight whether pipe is bare or insulated. Sleeves through floors shall extend 1" above finished floor surface.
- B. Rated Assemblies
 - 1. <u>Bare Pipe</u>. Same as for non-rated assemblies except that sleeves shall provide a clearance of 1" between sleeve and pipe. Clearance shall be packed for its entire length with a UL system 161 three hour classification such as a 3M FireDam 160 caulk at ends and mineral wool batt material stuffer in middle of penetration.
 - 2. Insulated Pipe. Insulation for pipe in sleeve shall consist of a 360 degree water-proofed calcium silicate insert sized to extend a minimum of 1" beyond each end of sleeve. Calcium silicate insert shall be of the same thickness of adjoining insulation. Clearance shall be packed for its entire length with a UL system 161 three hour classification such as a 3M FireDam 160 caulk at ends and mineral wool batt stuffer in middle of penetration.

2.14 FLASHINGS

A. Vent flashing shall be 4 lb. seamless lead, 16" sq. flange, length sufficient to be turned down 2" into vent. Oatey. Provide 24"x24" 4 lb. lead flashing at each roof drain. Flashing for other piping through roof shall be prefabricated galvanized steel roof-jacks with 16" sq. flange. Provide storm collar and seal water tight with mastic

2.15 YARD BOXES AND COVERS

A. One piece precast concrete with cast iron cover labeled "Sewer", "Gas", "Water", etc., as required. Provide traffic weight cover in traffic areas. Provide 6" minimum length "Thinwall" series 2000 6" diameter pipe extension to valves installed deeper than boxes. Install in workman like manner. Multiple boxes located on same centerline parallel to building exterior wall. Provide 6" concrete apron in non-paved areas.

PART 3 EQUIPMENT

3.01 GENERAL REQUIREMENTS

- A. Capacity. Capacities and efficiencies shall be in accordance with schedules shown on drawings. Scheduled numbers are to be considered minimum.
- B. Dimensions. Equipment must conform to space requirements and limitations indicated on drawings and as required for operation and maintenance. Equipment that does not readily conform to space conditions is unacceptable. Prepare and submit layout drawings for all proposed equipment substitutes showing actual job conditions, required clearances for proper operation, maintenance, etc.

PART 4 INSTALLATION

4.01 EQUIPMENT CONNECTIONS

- A. Water and drain connections shall be provided for each piece of equipment as required. Provide shut- off valve or fixture stop for each water supply to each piece of equipment whether or not equipment is furnished in this Specification Section.
- B. Provide a backflow preventer at each connection to equipment as required by code whether or not equipment is provided in this specification section.
- C. Provide a regulating valve at drinking fountain supplies. Valve, supply piping, and electrical connector shall be installed so as not to be visible.
- D. Ratings
 - 1. Gas. Natural gas burning equipment shall be furnished with 100% safety gas shut-off, intermittent pilot ignition, and be approved by AGA.
 - 2. Electrical. Equipment shall be in accordance with NEMA standards and U.L. listed where applicable standards have been established.
- E. Piping.
 - 1. Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be furnished, installed, and wired except where noted by others on drawings

4.02 WATER HEATERS - SEE PLUMBING FIXTURE SCHEDULE ON DRAWINGS.

4.03 CIRCULATING PUMP - SEE PLUMBING FIXTURE SCHEDULE ON DRAWINGS.

4.04 FIXTURES

- A. Piping beyond finished wall at each fixture shall be chrome plated.
- B. All piping supporting flush valves, hose bibbs, etc., shall be securely fastened to the building structure at each device to prevent movement of piping. All supplies to individual and/or adjacent fixtures shall be at same height and on center line of waste insofar as possible. Fixture height shall be as indicated on architectural drawings
- C. Wall hung fixtures shall have space between fixture and wall surface caulked with white silicone caulk.
- D. Rough-in and connection for trim and other fixtures supplied by others shall be included in this specification section.
- E. Where aerators are scheduled for the various fixtures, provide Chicago "Lam-A-Flo" Laminar flow controls.
- F. 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.

4.05 PIPING

- A. Constantly coordinate work with that of other trades so as to prevent any interference with this installation.
- B. Install cleanouts at ends of sewer 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.
- C. Vents shall terminate not less than 6" above the roof nor less than 12" 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.
- D. Condensate Drain Piping shall be installed with constant pitch of 1/8" per foot minimum. Provide tee with clean-out plug at all changes of direction. Provide a trap at each air handling unit to prevent air leakage. Connections to equipment mounted on vibration isolators shall be made with flexible connections.

- E. Freeze Protection
 - 1. All piping two inch and smaller located outside building and above ground and where exposed to freezing conditions shall be neatly wrapped with refrigerant insulated tape for freeze protection.
- F. Sterilization of Piping
 - Disinfect all domestic hot and cold water piping systems in accordance with 2022 CPC 609.10, "Disinfecting of Potable Water System". Disinfecting process shall be performed bu contractor and witnessed by a representative of the Engineer. During procedure signs shall be posted at each water outlet stating, "Chlorinating - Do not drink". After disinfecting, water samples shall be collected and sent to an independent lab for bacteriological analysis. Certificate of Bacteriological Purity shall be obtained from lab and delivered to the Owner through the Engineer.
- G. Tests and Adjustments
 - <u>Sanitary Sewer</u>. 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. Grade tests will be allowed on "ring-tite" PVC pipe.
 - 2. <u>Condensate Drain</u>. Similar to Sanitary Sewer.
 - 3. Domestic Hot and Cold Water Piping: Maintain 100 psig water pressure for 4 hours.

END OF SECTION 22 00 00

HEATING, VENTILATING & AIR CONDITIONING SECTION 23 0000

PART 1 GENERAL

1.01 GENERAL PROVISIONS

A. General Provisions of the contract including General and Supplementary Conditions apply to the work specified in this Section. The provisions of this section shall apply to all sections of Division 15 of these specifications.

1.02 SCOPE.

- A. Work 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. Air distribution systems.
 - 2. All equipment as shown or noted on the drawings or as specified.
 - 3. System energy balance.
 - 4. Demolition as indicated on drawings.
 - 5. HVAC controls. Basis of design is Pelican Controls.
 - 6. Acceptance testing as required under California Building Energy Efficiency Standards, Title 24.
 - Coordination with acceptance testing technician (ATT) and / or commissioning agent. Acceptance testing and / or commissioning required where noted in construction documents or per code requirements..

1.03 CODES AND STANDARDS

- A. All work and materials shall conform 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.
 - 1. Applicable codes and standards shall include but are not necessarily limited to:
 - a. California Code Of Regulations:
 - 1) Title 8, Industrial Relations
 - 2) Title 17, Public Health
 - 3) Title 19, Public Safety
 - 4) Title 21, Public Works
 - 5) Title 24, Energy Regulations
 - b. California Building Code.
 - c. California Mechanical Code

- d. California Plumbing Code
- e. Local Codes and Ordinances
- f. Air Moving and Conditioning Association (AMCA)
- g. American National Standards Institute (ANSI)
- h. Air Conditioning and Refrigeration Institute (ARI)
- i. American Society of Heating, Refrigerating, and Air Conditioning Engineers
- j. American Society of Mechanical Engineers (ASME)
- k. American Society for Testing and Materials (ASTM)
- I. American Water Works Association (AWWA)
- m. California Electrical Code (CEC)
- n. National Electrical Manufacturers Association (NEMA)
- o. National Fire Protection Association (NFPA)
- p. Occupational Safety and Health Act (OSHA)
- q. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
- r. Americans with Disabilities Act. Accessibility Guidelines for Buildings and Facilities. (ADAAG).

1.04 PERMITS AND FEES

A. The Contractor shall take out all permits and arrange for all tests in connection with such work as required. All charges are to be included in the work. All charges or fees for service connections, meters, etc., shall be included in the work.

1.05 COORDINATION OF WORK

- A. Before starting any work, thoroughly examine all existing and newly completed underlying and adjoining work and conditions upon which the installation of this work is in any way dependent for the workmanship required by the Contract Documents. Report to the Architect and Engineer in writing any and all conditions which might adversely affect this work and limit ability to perform the required workmanship.
- B. Layout of materials, equipment and systems is generally diagrammatic unless specifically dimensioned. The actual locations of all materials, piping, ductwork, fixtures, equipment, supports, etc., shall be carefully planned, prior to installation of any work, to avoid all interference's with each other, or with structural, electrical or architectural elements. Verify the proper voltage and phase of all equipment with the electrical plans. All conflicts shall be called to the attention of the Engineer prior to the installation of any work or the ordering of any equipment.

- C. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Carefully investigate the mechanical, electrical, structural, architectural drawings and field conditions that could affect the work to be performed and arrange such work accordingly. Provide the required piping and ductwork offsets, fittings, and accessories to meet such conditions.
- D. Spaces provided in the design of the building shall be utilized and the work shall be kept within walls or furring lines established on the drawings. Any discrepancy between Architectural or Mechanical drawings with respect to wall or furring locations and dimensions shall be brought to the Architect's attention for resolution before proceeding with installation.
- E. Any work which is done as an addition, expansion, or remodel of and existing system shall be compatible with that system.

1.06 MANUFACTURER'S RECOMMENDATIONS

A. All material, equipment, and devices, etc., shall be installed in a manner meeting approval of the manufacturer of the particular item. The Contractor shall make himself available of all installation manuals, brochures, and procedures that the manufacturer issues for the equipment and material. Contractor shall be held responsible for all installations contrary to the manufacturer's recommendations. Contractor shall make all necessary changes and revisions to achieve such compliance

1.07 GUARANTEE

A. Guarantee shall be in accordance with the General Conditions. 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.

1.08 QUIETNESS

A. Piping of all types, ductwork, and equipment shall be arranged and supported so that the vibration is at a minimum and is not transmitted to the building structure.

1.09 DAMAGES BY LEAKS

A. The Contractor shall be responsible for damages caused by leaks in the temporary or permanent piping or mechanical systems prior to completion of work and during the period of the guarantee.

1.10 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. Any item omitted from the submittal shall be provided as specified without substitution. All shop drawings must comply with the following:
 - 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 contract documents. Descriptive literature shall be current manufacturer's brochures and submittal sheets.
 - 2. All shop drawings shall be submitted at one time in a three hole binder with title sheet including Project Title, Architect, Engineer, 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 the are proposed. All equipment shall also be identified by the mark number as indicated on drawings. Submittals shall bear the stamp of certification by the Contractor as evidence that the Contract Documents (Specifications and Drawings) have been thoroughly checked.
 - 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. 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. Unless otherwise noted, alternate manufacturers may be submitted for review by the Engineer. 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. No more than one submittal will be considered on a proposed alternate for any item.

- 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.
 - 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. Submittals for products and equipment offered as an alternate to that specified will require, if accepted by the Engineer, resubmission of the Title 24 Energy Compliance Calculations if the specified product or equipment was included within the scope of the approved calculations on file with the reviewing authority. The cost of preparing resubmission will be the responsibility of the Contractor.

1.11 HANGERS AND SUPPORTS.

- A. Provide all hangers, bracing, and supports for the proper installation of equipment and materials under this Section of the Specification.
- B. Any structural element required to properly hang or support piping, ducts, or equipment, etc., provided under this Specification Section and not shown on the Architectural or Structural Drawings shall be provided under this Specification Section.
- C. All ductwork and piping shall be supported and seismically braced to prevent contact with other building elements or components during a seismic event.

1.12 CONTINUITY OF SERVICES

- A. All existing services and systems shall be maintained except for short intervals when connections are to be made. The contractor shall be responsible for any interruptions of services and shall repair damage done to any existing service caused by the work.
- B. If utilities not indicated on the drawings are uncovered during excavation, the Contractor shall notify the architect immediately for further instructions.

1.13 ELECTRICAL CONNECTIONS

- A. Provide under Specification Division 23 00 00 all required control conduit, wiring, controls and control panels as indicated on the drawings or as may be required for system operation.
- B. No control device shall be mounted with rigid connections on vibration isolated mechanical equipment. No field furnished control device shall be mounted on any piece of equipment so that it interferes with physical access of air or water flow, or covers any portions of nameplates or access doors.
- C. Starters.
 - 1. Magnetic motor starters for all equipment shall be furnished under this Specification for installation under Specification Division 26, except those shown to be in a motor control center on the Electrical Drawings and those located in factory assembled units.
 - Starters shall be of the appropriate horsepower and voltage, equipped with the proper NEMA enclosures for indoor and NEMA 3R enclosures for outdoor, with thermal overloads, necessary auxiliary contacts, and ambient compensated overloads, one in each leg.
 - 3. A circuit breaker shall be mounted in a common enclosure unless the starter is not mounted within sight of the motor, in which case the disconnecting means shall be a separate device provided under Specification Division 26, Electrical. Mounted in the starter cover shall be "hand-off-automatic" and "reset" control devices. Magnetic switches shall be of pivoted armature design. Starters shall have auxiliary contacts as required by the control system.
- D. Motors.
 - Shall be selected for quiet operation, voltage, and rpm to match the project electrical characteristics. Motors shall be open, drip-proof, normal torque and weatherproofed where indicated or required. Motors shall be of the NEMA premium efficiency type.
- E. Electrical Coordination
 - 1. Prior to commencing construction arrange a conference with the electrical and mechanical trades as well as equipment suppliers and verify types, sizes, locations, voltage requirements, controls and diagrams of all equipment furnished by them. In writing, inform the Architect that all phases of coordination of this equipment have been covered and if there are any unusual conditions or problems they shall be enumerated at this time.

1.14 FLASHING

A. Whenever any part of the Mechanical System(s) must penetrate the roof or outside wall, the openings shall be flashed and counter-flashed absolutely water tight with minimum 22 gauge galvanized sheet metal, prime coated. Flashing aprons shall extend not less than eight inches (8") from the duct, pipe, or supporting member in all directions unless detailed otherwise. All penetrations shall be flashed following the procedures of the National Roofing Contractor's Association

1.15 PAINTING

A. Paint all black iron supports, hangers, anchors, etc., and all uninsulated black iron pipe work installed in weather exposed locations with one coat of rust resisting primer.

1.16 ACCESS DOORS AND PANELS

- 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 or as required to match wall construction. 16-gauge steel frame and 14-gauge steel panel with paintable finish, except in ceramic tile, where panel shall be 16-gauge stainless steel with satin finish. Continuous hinge. Screwdriver latch. Deliver panels to the General Contractor for installation. Provide Zurn Z-1460-4 for square doors and Z-1460-5 for rectangular doors, Karp, or equivalent. Unless otherwise noted , the minimum sizes shall be as follows:
 - 1. 1 value up to 1-1/2"12"x12"2. 1 value up to 3"16"x16"
 - 3. Fire damper, damper actautor 24"x24"

1.17 SYSTEM IDENTIFICATION

- A. Equipment. All equipment shall be identified with a plastic laminated engraved nameplate which bears the unit number marked as indicated on the drawings (e.g. AC-4, WH-1) Provide 1/2" high lettering - white on black background. Nameplates shall be permanently secured to the unit.
- B. Below Grade Piping
 - 1. Bury a continuous, pre-printed, bright colored plastic ribbon marker with each underground pipe. Locate directly over buried pipe, 6" to 8" below grade

- C. Valves
 - Provide brass valve tags on all valves of each piping system, including check valves, valves within equipment, faucets, stops and shut-off valves at fixtures and other repetitive terminal units. Prepare and submit for review and acceptance by the Engineer a tagged-valve schedule, listing each valve by tag number, location and piping service. Mount in plastic faced frame where directed by Architect.

1.18 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, such as X-Tru-Coat or Scotchkote. All fittings and areas of damaged coating shall be covered with two layers of double wrap 10 mil polyvinyl tape to total thickness of 40 mils. Johns-Manville. Protective coating shall be extended 6" above surrounding grade.

1.19 CONCRETE ANCHORS

A. Steel bolt with expansion anchor requiring a drilled hole - powder driven anchors are not acceptable. Minimum concrete embedment shall be 4½ diameters. Minimum spacing shall be 10 diameters center to center and 5 diameters center to edge of concrete. Maximum capacity shall be determined in compliance with ACI 318-19, Chapter 17 and the anchor's engineering evaluation report. Hilti, Phillips. Wej-it. Exterior locations shall utilize stainless steel hardware.

1.20 DEFINITIONS

- A. Provide. The term "provide" as used in these specifications or on the Drawing shall mean furnish and install.
- B. Piping. The term "piping" as used in these Specifications or on the Drawings shall mean all pipe, fittings, nipples, valves, unions, hangers, and thermal 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, and thermal insulation, etc., and other devices as may be required to make a complete and functional system.
- D. Wiring. The term "wiring" shall include the provision of all necessary products which are required for a complete installation and shall include products such as conduit, electrical boxes, connections, transformers, relays and switches.
- E. OSHPD. Office of Statewide Health Planning and Development.

1.21 PROJECT CLOSE-OUT

A. Record Drawings

- 1. Provide in accordance with general conditions of the specifications.
- B. Operation and Maintenance Manual for Mechanical Systems
 - Provide three (3) copies of Operation and Maintenance Manuals to the Engineer for review and acceptance. Provide the Owner's designated representative with one copy of the approved O & M manual. Bind Operation and Maintenance Manuals for each Mechanical System (Plumbing, Air Conditioning, etc.) in a hard-backed binder. Cover of each binder shall have the following lettering:

OPERATION AND MAINTENANCE MANUAL M.O.T. BUILDING FAIRFAX SCHOOL DISTRICT BAKERSFIELD, CALIFORNIA

Provide a transmittal letter at the beginning of the manual on the Contractor's letterhead. Letter shall be signed by a contractor principal (Owner or Corporate Officer) and shall be countersigned by the Owner's designated representative and shall indicate the date when the mechanical systems were shown and explained in detail to the Owner's designated representative. (The Engineers office shall be notified 48 hours minimum prior to the owner-contractor meeting.)

Provide a master index at the beginning of Manual showing items included. Use plastic tab indexes for the sections of the Manual.

Section 1, General. Provide:

- Name of Architect, Mechanical Engineer, Contractor and Mechanical Sub-Contractor.
- A complete list of installed equipment with project mark number, indicating name of vendor, address and phone number.
- A sub-section with manufacturer's descriptive literature for each item of installed equipment with model, capacities, and all other pertinent information highlighted.

Section 2, Operating instructions. Provide:

- General description of each separate system and sub-system.
- Step by step procedure to follow in putting each piece of mechanical equipment into operation. Start-up sheets must be signed by the owner of the installing contractor certifying that the start-up has been completed per manufacturer's written instruction.

• Schematic as-built control diagrams for each separate system. Diagrams shall bear the date of the acceptance of the project. Include all temperature control panels and their respective functions.

Section 3, Maintenance Instructions. Provide:

- Summary list of mechanical equipment used indicating name, model, serial number, and nameplate date of each item together with number and name associated with each system item.
- Manufacturer's maintenance instructions for each piece of mechanical equipment installed in project. Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment and maintenance and lubrication instructions.

Section 4, Air Conditioning System Balance and Test Run Reports. Provide:

- One-half size reproduction of air conditioning plans annotated to match tabulated measurements.
- Tabulated and summarized measurements.

Section 5, Warranties. Provide:

• A copy of each manufacturer's warranty statement, completely filled out and indicating date forwarded to the respective manufacturer.

PART 2 MATERIALS.

2.01 DUCTWORK.

- A. General.
 - Construct ductwork to meet all functional criteria defined in section VII, of the SMACNA "HVAC Duct Construction Standards Metal and Flexible". This shall subsequently be referred to as the SMACNA manual.
 - 2. Interior ducts shall be constructed with G-60 or better galvanized steel (ASTM 527) LFQ, chem treat. Exterior ductwork or any duct exposed to high humidity conditions (i.e. dishwasher exhaust) shall be G-90 or better.
 - 3. Support, access doors not part of ducts, bar or angle reinforcing damper rods and items made of uncoated mild steel shall be painted with two coats of two coats primer or provide galvanized equivalent.
- B. Rectangular Ducts.
 - 1. Construct ductwork and supports to meet all functional criteria defined in section VII, of the SMACNA "HVAC Duct Construction Standards Metal and Flexible" 2005 Edition. Hanger spacing shall not exceed 8'.

- C. Ells. Rectangular ells of ninety degrees shall be mitered and fitted with AERO/DYNE, "HEP" or equivalent, adjustable turning vane of airfoil contour design. Side rails shall be installed so that vane at heel of elbow shall fit snugly without air passing on the back side. Spacing of vanes according to manufacturers recommendations.
- D. Round Ducts.
 - 1. Galvanized.
 - a. Spiral lockseam with standing rib duct. For round ducts, 8" diameter or less, provide Noll or Young and company snap-lock galvanized steel.
 - b. Round elbows shall be pleated or welded gore (5 piece ells). Nonwelded gore elbows for use with snap lock ducts shall be taped at gore intersections.
- E. Duct Joints.
 - Rectangular. All ducts shall utilize "Ductmate 25/35" factory fabricated duct joint connectors with #440 gasket tape. Flanged interior gaskets shall be Ductmate #440 or Butyl Rubber Gasket which meets Mil-C 18969B, Type II Class B, and TTS-S-001657 must also pass UL-723. The material must not contain any vehicle that will support fungal or bacterial growth. Formed on flanges shall not be accepted for any duct exceeding 42" in width or any duct subjected to greater than 2" W.G..
 - Round. All round ducts shall utilize male-female slip joints with minimum three (3) sheet metal screws. 0-20" ducts shall utilize sealing compound applied continuously around joint before assembling and after fastening. Wrap joints with 3" wide duct tape. 21" – 72" ducts, use 3-piece, gasketed, flanged joints consisting of two internal flanges (with integral mastic sealant), and one external closure band. Ductmate Spiralmate or equal.
- F. Sealing.
 - 1. Interior to Building Hardcast fiber tape and liquid adhesive. DT-5300 or DT-540 tape. FTA-20 adhesive. Ductmate PROseal.
 - 2. Exterior to Building For joints exposed to weather, sealant shall be G.E. silicone. For joints not exposed to weather, sealant shall be Eco-Duct Seal 44-60, or United Sheet Metal.
 - 3. Exposed Ducts. All joints shall use Hardcast Galva-Grip or equivalent. Joint shall be finished clean from outward appearance.
- G. Flexible Insulated Ducts.
 - Shall be J.P. Lamborn Company Type AMF or Thermoflex M-KE acoustical low pressure duct. Duct shall be listed and labeled UL-181 Air Duct; meet NFPA-HUD minimum standards and comply with UMC 6. Duct factory R-value 4.2 minimum. In un-conditioned spaces, R-8 minimum.

- 2. Hangers shall consist of minimum 3" wide 28 gauge galvanized steel and shall be spaced a maximum of 36" on center. Flexible duct shall be installed in compliance with the manufacturer's latest installation instructions. No kinks or sharp bends allowed. Turning radius shall be a minimum of 1.5 times diameter of duct. A copy of which shall be at the site during and after installation. Provide a minimum of at least one hanger per duct section.
- Connections to round ducts or collars shall be made with galvanized or stainless steel worm clamps or "Panduit" adjustable clamps listed by UL-181.
- 4. Unless indicated otherwise on the drawings, flexible duct shall be limited to the final 5 foot portion of the duct system connecting to the supply diffuser or return grille. Flex duct shall be limited to factory cut pieces with factory applied end connections.
- H. Fire Dampers.
 - Fire damper assembly shall bear the U.L. 555 Label and the California State Fire Marshall listing number. Provide duct access door to fire damper as required by job conditions in compliance with Title 24, California Mechanical Code. Fire dampers shall be installed in all rated walls and ceilings penetrated by ducts, grilles and diffusers. Fire damper shall have rating equivalent to construction. Dampers shall be installed in strict compliance with manufacturer's installation instructions.
- I. Fire/Smoke Dampers.
 - Damper Assembly shall bear the U.L. 555S Label and State Fire Marshall listing number. Provide access door to smoke damper as required by job conditions in compliance with Title 24, California Mechanical Code. Means of disconnect shall be provided between detector and damper(s), where detector is included as factory mounted and wired. Dampers shall meet most current standard for UL testing. UL555 and UL555S. Dampers shall be suitable for a dynamic system. See details on plans for leakage and velocity requirements. If not listed on plans, provide leakage class I and velocity level at 3,000 FPM.
- J. Volume Dampers.
 - Branch Duct Volume Damper Volume control damper (VCD) in square or rectangular ducts shall be as follows: Opposed blade, 6" maximum blade width, 16- gauge blade, 48" maximum length, nylon or oil impregnated bronze bearings, 1/2" diameter pin shaft, 16-gauge channel frame, actuating rod out of air stream. VCD in round duct shall be as follows: Damper blade full height of branch and 1" less than branch width. All branch dampers shall have regulator with spring loaded shaft nut and serrated self-locking die cast core. Ventlok 640. Provide remote ceiling operator with chrome plated or painted cover where shown on drawings or where damper control is otherwise inaccessible.

- K. Back-draft Dampers.
 - 1. Unless otherwise noted on drawings: .025 aluminum counter-balanced blades with felt strip on mating edges, and machined brass mounted in six gauge steel channel frame, Pacific Model PRO 1100AI or equal. Normally closed back-draft dampers are required at all roof exhaust fans and all outside air intakes.
- L. Bellows Duct Connections.
 - 1. U.L. Listed neoprene coated 30 ounce fiberglass cloth. 3" metal, 3-1/4" fabric, 3" metal. Ventglass, Dura-Dyne. Ductmate PROflex. Connectors with single fold seams will not be accepted.
- M. Duct Fire Caulking.
 - All ductwork passing through rated assemblies that do not have a fire or fire/smoke damper shall be installed with a U.L. listed fire caulking assembly. Exact details of U.L. listed assembly shall be followed. Provide inspector of record and project engineer submittal showing U.L. listed fire caulking detail that the contractor intends to use for each condition. In lieu of fire caulking, at contractors option, provide fire damper installed in accordance with U.L. listing

N. Filters.

- 1. Pre-Filters.
 - a. Minimum of MERV 13 filter, consisting of a nominal 2" thick, pleated type, panel filter, CSFM listed. Initial resistance at 500 feet per minute face velocity shall not exceed 0.30" w.g. Provide one complete change of all filters after air balance is completed and prior to final acceptance

2.02 PIPING.

- A. Refrigerant Piping.
 - General. Copper Type "L", hard drawn, ASTM B88 with wrought copper fittings, silver alloy brazed 1100°F., joints, Sil-Fos or equal. Size 3/8" O.D. and smaller to be refrigerant tube ASTM B 280. All elbows to have long radius.

2.03 INSULATION.

- A. All insulation shall be instrict compliance with California Building Energy Efficiency Standards, 2022 Edition, Title 24.
- B. Refer to table 120.3-A for pipe insulation thickness required. This shall be a minimum. If construction documents call for a higher rating, the higher rating shall apply.
- C. Insulation shall have a flame spread of not more than 25 and a smoke developed rating of not more than 50.

D. Ducts.

- General. All supply, return, exhaust ducts and plenums shall be insulated externally and/or lined internally as specified herein or as indicated on the drawings. Ducts in directly or indirectly conditioned spaces shall be insulated to aminimum level of R4.2 Ductwork in unconditioned spaces such as an attic where the roof insulation is at the ceiling level or where located outdoors shall have an insulation level of R8 minimum.
- 2. Ducts in Attics. All supply and return ducts shall be insulated externally with 2" thick fiberglass 3/4# density. Where rectangular ducts are lined internally, they shall be wrapped on the exterior with 1" thick fiberglass, 3/4# minimum density.
- 3. Exposed Ducts Within Conditioned Spaces. Shall not require external insulation unless noted on the drawings.
- 4. Ducts Exposed to Weather All supply and return ducts shall be lined internally with 2" thick Manville "Permacote Linacoustic" glass fiber and thermosetting resin duct liner, R-8. Provide with antimicrobial edge coating, Johns Manville Superseal Edge Treatment or Superseal HV. Coating edges with adhesive is not acceptable. All field cut edges must be coated prior to delivering duct to job site. Any lined duct left untreated that has been subjected to dirt and / or dust will be rejected, and will not be accepted for installation. Edges must be treated so that complete coverage is obtained, with no raw edges. Apply as directed by manufacturer's literature.
- 5. Interior Duct Surfaces. All supply, return. or exhaust duct connections to air conditioning units or fans shall be internally lined for a minimum distance of ten lineal feet upstream and downstream of fan unless otherwise indicated on the drawings. Interior duct liner where applied for attenuation purposes only shall be 1" thick Manville "Permacote Linacoustic" glass fiber and thermosetting resin duct liner, R-4.2. Provide with antimicrobial edge coating. See paragraph above.
- 6. Duct Wrap. Shall be tightly wrapped around ducts to prevent sagging with longitudinal and transverse lap of at least 6". Laps shall be wired or stapled to eliminate gaps. Insulation shall be secured by wrapping with 18 gauge galvanized wire 12 o.c. adhesive. Insulation shall be applied with density identification exposed.
- 7. Duct Liner Shall be adhered to clean metal with minimum 100% coverage of adhesive such as 3M Adhesive #38, additionally secured with approved mechanical clips or welded pins per SMACNA standards. Provide with antimicrobial edge coating. Apply per paragraph 2 d) above. Coating edges with adhesive is not acceptable.

E. Refrigerant. Cover piping with foamed plastic insulation. Longitudinal and end seams shall be thoroughly cemented with adhesive in accordance with manufacturer's recommendations. Cover all fittings, valves and connections. Weatherproof piping insulation with .016 Childers aluminum jacket, or equivalent. Coverings shall be banded at 12" o.c. with 1/2" thick x 0.2 aluminum bands and seals.

PART 3 EQUIPMENT.

3.01 GENERAL REQUIREMENTS

- A. Start-up. All equipment shall be started and tested in strict accordance with the manufacturer's written instructions. Provide the inspector of record factory start-up literature for each mechanical item. Demonstrate to inspector that strict compliance to the start-up procedure has been completed for each item. Start-up sheets must be completed and turned in with the O&M manuals. Start-up sheets must be signed by the owner of the installing contractor certifying that the start-up has been completed per manufacturer's written instruction.
- B. Acceptance Testing. Complete acceptance testing of all systems and equipment as required under the Building Energy Efficiency Standards, 2023 Edition, Title 24. Submit all completed and signed forms to the building department or the Division of the State Architect, where applicable.
- C. Capacity. Capacities shall be in accordance with schedules shown on drawings. Capacities are to be considered minimum.
- D. Dimensions. Equipment must conform to space requirements and limitations as indicated on drawings and as required for operation and maintenance. Where architectural screening is indicated, equipment shall not extend above or beyond screening. Equipment is not acceptable that does not readily conform with the 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.
- E. Ratings.
 - 1. <u>Electrical.</u> Electrical equipment shall be in accordance with NEMA Standards and UL listed where applicable standards have been established.
- F. 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 none-potable use shall be provided with backflow preventer acceptable for intended use by local governing authorities.

- G. Electrical.
 - 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 provided. Provide terminal blocks for controls and interlocks not included in equipment package.
 - 2. 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 underground conductor. Switches, contacts and other devices shall be in undergrounded conductors.
 - 3. Motors. Shall be rated, constructed and applied in accordance with NEMA and ANSI Standards without using service factor. Single-phase motor shall be of type to suit application. Three- phase motors shall be of type to suit application. Three-phase motors shall be open drip proof, NEMA B design on pumps and fans, NEMA C on reciprocating equipment, sealed ball bearing, three-phase indication. Insulation shall be double dip and bake with Class F thermal polyester non-hygroscopic epoxy base insulating materials. Design shall limit starting inrush current and running current to values shown on drawings. Motors exposed to weather shall be open drip-proof approved by manufacturer for this type of service. All motors 1 horsepower and larger shall be the high efficiency type with efficiency and power factor equal or exceeding Century E-Plus.
- H. Fan Selection.
 - Fan Curves. Performance curves shall be submitted for all units of 3000 CFM or greater. Operating point for forward curved fans shall be from point of maximum efficiency toward increased CFM limited by horsepower scheduled. Operating point for backward inclined fans shall be selected near point of maximum efficiency. Curves shall plot CFM verses static pressure with constant brake horsepower, RPM and efficiency lines.
 - 2. Static Pressure. Unless otherwise noted, pressure scheduled as external static pressure (ESP) includes all ductwork and accessory losses external to the unit housing. Unless otherwise noted, pressure scheduled as total static pressure includes all ductwork, filter, coil, cabinet, damper and other accessory losses. Unless otherwise noted, pressure scheduled as duct static pressure includes all supply and return ductwork and accessory losses external to the unit housing and plenum (as applicable). The allowance for filter losses is 0.3" WC, unless otherwise noted. Submit itemized static pressure losses for all components.
- I. Screens. All duct or louver openings to the outside shall be covered with 1/4" galvanized screen.

PART 4 INSTALLATION

4.01 DUCTWORK.

- A. Installation shall conform with NFPA 90A and SMACNA Low Pressure Duct Construction Standards 2005 Edition. Provide mounting and supporting of Ductwork and accessories including, but not limited to, structural supports, hangers, vibration isolators, stands, clamps and brackets, access doors, and dampers. Install ductwork accessories as indicated in accordance with the manufacturer's printed instruction. Allow clearance for inspection, repair, replacement, and service. Ductwork and accessories shall be installed in a manner to prevent vibration and rattling.
- B. Deflectors. Provide in rectangular elbows, duct mounted supply outlets, takeoff or extension collars to supply outlets, and tap-in branch take-off connections. 45 degree take-off is an acceptable alternative for low velocity systems (below 1,500 FPM).
- C. Grilles. Each air inlet and outlet shall be flush with finished surface of wall or ceiling and shall be securely attached thereto. Provide plaster grounds at locations of all wall and hard surfaced ceiling grilles.
- D. Branch Take-Offs. All branch ducts from main supply air and to return air trunk duct shall be provided with splitter blade full height of branch take-off and 1" less than branch width. Regulators to be Young or equal. Dampers located in inaccessible areas shall have extended shafts with concealed regulator in adjacent ceiling or wall.
- E. Dampers. Install volume control damper and damper regulator on all branch ducts.
- F. Flexible Glass Fiber Duct. The use of flexible duct is limited to the last 5 feet of each branch duct (i.e. one 5 foot section of flexible duct may used to connect the grille to the sheet metal branch duct). No joints permitted in 5' length. Joints shall be installed with metal bands and fiber tape and adhesive. Minimum turn radius shall be in accordance with SMACNA Standards (turn radius of duct centerline not less than 1.5 times the duct diameter).
- G. All [ducts] and [mechanical / plumbing piping] shall be supported and seismically braced in compliance with OSHPD Pre-Approval No. OPM-0052-13 the "B-Line / Tolco Seismic Restraint System" or other OSHPD preapproved system. Copies of the above publication and details shall be provided by the Contractor and maintained at the project site until final acceptance.

4.02 PIPING.

- A. General. 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 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.
- B. Hangers. Support at intervals with hangers as specified elsewhere within these Specifications or as indicated on the Drawings. No piping shall be in contact with any part of the building structure including sub-assemblies.
- C. Obstructions. Piping shall be installed to clear beams, etc., unless sleeving is particularly indicated. Constantly coordinate work with that of other trades so as to prevent any interference with this installation.
- D. Fittings.
 - 1. All joints and changes in direction shall be made with long sweep fittings.
- E. Refrigerant Piping.
 - Pipe shall be cut square. Joint surfaces shall be thoroughly cleaned, fitted and erected before brazing. After installation, evacuate to 29 inches of mercury, ambient temperature during evacuation, fill with dry nitrogen to 250 psi and maintain for two-hour period without additional charge. After nitrogen test, purge with refrigerant charged through dryer and maintain holding charge in system and equipment.

4.03 INSULATION.

A. See materials section of this specification for installation requirements.

4.04 EQUIPMENT INSTALLATION.

A. It shall be the responsibility of the equipment installer to ensure 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.

4.05 SYSTEM AIR BALANCE.

A. General.

- 1. The contractor shall employ the services of an independent system balancing company registered by AABC, NBC, or NEBB. The balancing contractors shall be limited to one of the following:
 - a. Air Control Services 515 E. 19th St., Bakersfield, CA 93305 (661) 327-8755
 - b. Air Control Balancing 1959 N. Gateway #103, Fresno, Ca. 93727 (559) 454-8000
 - c. American Air Balance 4721 E. Hunter, Anaheim, Ca. 92807 (714) 693-3700
 - d. Los Angeles Air Balance Co. 1848 W. 11 St., Upland, Ca. 91786 (909) 931-1114
 - e. RS Analysis 111 Natoma Street, Folsom, Ca. 95630 (916) 351-9842
 - f. National Air Balance 4171 Business Center Drive, Fremont, Ca. 94538 (510) 623-7000
- 2. Submit within thirty (30) days after receipt of contract, submittal data forms of the selected balance company for the testing and balancing of the air conditioning, heating, and ventilation systems.
- 3. After development of the balancing procedure to be followed for each respective system, a representative of the system balancing company shall periodically visit the jobsite, particularly before any insulation is applied to ducts or piping, and confirm the suitability of the ducts, piping, accessories, hardware, and access panels installed for balancing. Any noted deficiencies shall be reported to the Contractor in writing with a copy to the Engineer. Noted deficiencies shall be corrected at this time by the Contractor.
- 4. Final system testing and balance shall not begin until the system has been completed and is in full working order. The Contractor shall put all heating, ventilating, and air conditioning systems and equipment into full operation and shall continue the operation each working day during the balancing procedure. The balancing company shall be responsible for all adjustments to the heating, cooling and ventilating equipment necessary for the system to operate as specified. Upon completion conduct a running test under substantial load conditions demonstrating to the satisfaction of the Owner's representative that all equipment and controls are operating as intended and have been properly adjusted for these conditions.
- 5. The system balance company shall include an extended warranty of one hundred eighty (180) days after completion and acceptance of test and balance work, during which time the Engineer at his discretion may request a recheck, or resetting of any outlet, fan, etc., as listed in report. The system balance company shall provide technicians to assist the Engineer in any re-test required during this period. Seasonal re-balance during the first year of operation is part of the scope of this specification.

- 6. The flow quantities shown on the drawings are not to be considered absolute. If changes in flow quantities are required to attain comfort conditions in any area, the balancing company shall make the required changes at no extra cost.
- B. Procedure.
 - The testing and balancing of the systems, including all equipment, ducts, piping, and accessories shall be done in strict compliance with the latest edition of the Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems as published by National Environmental Balancing Bureau or equivalent AABC standard.
- C. Acceptance of Tests.
 - 1. In the event any tests or inspections prove unsatisfactory, such shall be made a matter of record. Acceptance of the system shall be postponed until all defects or improper adjustments have been corrected and the work is again inspected and tests satisfactorily repeated.
- D. Data to be Furnished.
 - 1. At completion of running tests two (2) complete sets of data listed below for all items of equipment shall be furnished for incorporation in Owner's Equipment Manual for the project:
 - 2. Manufacturer's equipment outline drawings.
 - 3. Manufacturer's performance curves for fans, pumps, and flow control devices and capacity tables for equipment.
 - 4. Pertinent running test data; such as system test points, test point data, horsepower, RPM, FLA, etc., including final instrument set points and adjustments as left.
- E. Fan Drives.
 - Shall be changed as necessary to obtain the desired flow rate at minimum brake horsepower and to avoid objectionable fan or air noise in any part of the building. As a part of the work of this contract, the Contractor shall make any changes in the pulleys, belts, and dampers or the addition of dampers, required for the correct balance as recommended by system balancing company, at no additional cost.
- F. Pump Impellers.
 - Shall be changed as necessary to obtain the desired flow rate at minimum break horsepower and to avoid objectionable pump or water noise in any part of the system. As part of the work of this contract the Contractor shall make any changes in the impeller, valves, or the addition of valves, required for correct balance as recommended by the system balance company.

4.06 TEMPERATURE CONTROLS:

A. General.

- 1. A complete system of automatic temperature control shall be provided. Complete system shall consist of the existing plus that which is necessary for proper function and operation
- 2. Wall plates for any control located in finished areas shall match finish of light switch plates in that same area.
- 3. All conduit and wiring shall be installed in strict compliance with spec division 26, electrical.
- 4. Sequence of Operation. Refer to temperature control diagram on the drawings. With initial submittal and on record drawings include narrative of system operation describing start-up, automatic operation, and shut-down.
- B. Electrical Wiring. All electrical wiring and conduit in connection with the drawings shall be provided under Specification Division 23. Any wiring not shown on the drawings but required for proper operation of the automatic temperature control system shall be performed under this Section.

END OF SECTION 23 00 00

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES SECTION 26 05 19

PART1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Copper building wire rated 600 V or less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 PRODUCTS

2.01 COPPER BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper currentcarrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - 1. <u>Alpha Wire Company</u>.
 - 2. Belden Inc.
 - 3. <u>Cerro Wire LLC</u>.
 - 4. General Cable Technologies Corporation.
 - 5. Southwire Company.
- C. Standards:
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 - 2. RoHS compliant.
 - 3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Conductor Insulation:
 - 1. Type THHN and Type THWN-2: Comply with UL 83.

2.02 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by the following:
 - 1. <u>3M Electrical Products</u>.
 - 2. AFC Cable Systems; a part of Atkore International.
 - 3. <u>Hubbell Power Systems, Inc</u>.
 - 4. Ideal Industries, Inc.
 - 5. <u>ILSCO</u>.
 - 6. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - 7. <u>Service Wire Co</u>.
 - 8. <u>TE Connectivity Ltd</u>.
 - 9. Thomas & Betts Corporation; A Member of the ABB Group.
- C. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
 - 1. Material: Copper.
 - 2. Type: One hole with standard barrels.
 - 3. Termination: Compression.

PART 3 EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Feeders: Copper for feeders. Conductors shall be solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- C. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- D. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway.
- B. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Section 26 05 29 "Hangers and Supports for Electrical Systems."

3.04 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.05 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 26 05 53 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.06 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.07 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 07 27 00 "Firestopping."

END OF SECTION 260519

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS SECTION 26 05 26

PART1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes grounding and bonding systems and equipment.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.02 MANUFACTURERS

- A. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - 1. Burndy; Part of Hubbell Electrical Systems.
 - 2. ERICO International Corporation.
 - 3. <u>ILSCO</u>.
 - 4. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - 5. SIEMENS Industry, Inc.; Energy Management Division.
 - 6. Thomas & Betts Corporation; A Member of the ABB Group.

2.03 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.

- 4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
- 5. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
- C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.04 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- C. Bus-Bar Connectors: Compression type, copper or copper alloy, with two wire terminals.
- D. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.
- E. Cable-to-Cable Connectors: Compression type, copper or copper alloy.
- F. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.
- G. Conduit Hubs: Mechanical type, terminal with threaded hub.
- H. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.
- I. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.
- J. Water Pipe Clamps:
 - 1. Mechanical type, two pieces with stainless-steel bolts. a. Listed for direct burial.
 - 2. U-bolt type with malleable-iron clamp and copper ground connector.

2.05 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad Stainless steel; 3/4 inch by 10 feet (19 mm by 3 m).
PART 3 EXECUTION

3.01 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare tinned-copper conductor..1. Bury at least 24 inches (600 mm) below grade.
- C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- D. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Install bus horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
 - 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.
- E. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.

3.02 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.03 GROUNDING SEPARATELY DERIVED SYSTEMS

A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

3.04 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - 1. Feeders and branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.
 - 4. Single-phase motor and appliance branch circuits.
 - 5. Three-phase motor and appliance branch circuits.
 - 6. Flexible raceway runs.
 - 7. Armored and metal-clad cable runs.
- C. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

3.05 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.
- C. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 - 2. Use exothermic welds for all below-grade connections.
- D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations; if a disconnecttype connection is required, use a bolted clamp.

- E. Grounding and Bonding for Piping:
 - Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 - 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 - 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- F. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.
- G. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; use a minimum of 20 feet (6 m) of bare copper conductor not smaller than No. 4 AWG.
- H. 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 are 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.

3.06 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Tests and Inspections:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

- 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal[, at ground test wells][, and at individual ground rods]. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
- 4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- C. Grounding system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS SECTION 26 05 29

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Conduit and cable support devices.
 - 2. Mounting, anchoring, and attachment components, including powderactuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.

1.03 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 the following:
 - a. Clamps.
 - b. Hangers.
 - c. Sockets.
 - d. Eye nuts.
 - e. Fasteners.
 - f. Anchors.
 - g. Saddles.
 - h. Brackets.

PART 2 PRODUCTS

2.01 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- B. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

- C. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - 1) <u>Hilti, Inc</u>.
 - 2) ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.
 - 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated or stainless steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - 1) <u>B-line, an Eaton business</u>.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti, Inc.
 - 4) ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 - 3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
 - 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
 - 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 - 6. Toggle Bolts: All-steel springhead type.
 - 7. Hanger Rods: Threaded steel.

PART 3 EXECUTION

3.01 APPLICATION

- A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
 - 1. NEČA 1.
 - 2. NECA 101
- B. Comply with requirements in Section 072700 "Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

- C. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."
- D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slottedsupport system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps.
- F. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.02 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.
- B. 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).
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.
 - 6. To Light Steel: Sheet metal screws.
 - 7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slottedchannel racks attached to substrate.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.03 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.04 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "Cast-in-Place Concrete."
- C. Anchor equipment to concrete base as follows:
 - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.05 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 minimum dry film thickness of 2.0 mils (0.05 mm).

END OF SECTION 26 05 29

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS SECTION 26 05 33

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Metal conduits and fittings.
 - 2. Nonmetallic conduits and fittings.
 - 3. Metal wireways and auxiliary gutters.
 - 4. Surface raceways.
 - 5. Boxes, enclosures, and cabinets.
 - 6. Handholes and boxes for exterior underground cabling.
- B. Related Requirements:
 - 1. Section 072700 "Firestopping" for firestopping at conduit and box entrances.

1.03 **DEFINITIONS**

- A. GRC: Galvanized rigid steel conduit.
- B. IMC: Intermediate metal conduit.

1.04 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

PART 2 PRODUCTS

2.01 METAL CONDUITS AND FITTINGS

- A. Metal Conduit:
 - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - a. AFC Cable Systems; a part of Atkore International.
 - b. <u>Allied Tube & Conduit; a part of Atkore International</u>.
 - c. <u>Electri-Flex Company</u>.
 - d. <u>FSR Inc</u>.
 - e. <u>Korkap</u>.

- f. O-Z/Gedney; a brand of Emerson Industrial Automation.
- 2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- 3. GRC: Comply with ANSI C80.1 and UL 6.
- 4. IMC: Comply with ANSI C80.6 and UL 1242.
- 5. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
 - a. Comply with NEMA RN 1.
 - b. Coating Thickness: 0.040 inch (1 mm), minimum.
- 6. EMT: Comply with ANSI C80.3 and UL 797.
- 7. FMC: Comply with UL 1; zinc-coated steel.
- 8. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- B. Metal Fittings:
 - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - a. AFC Cable Systems; a part of Atkore International.
 - b. Calconduit.
 - c. Electri-Flex Company.
 - d. <u>NEC, Inc</u>.
 - e. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - 2. Comply with NEMA FB 1 and UL 514B.
 - 3. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 4. Fittings, General: Listed and labeled for type of conduit, location, and use.
 - 5. Fittings for EMT:
 - a. Material: Steel.
 - b. Type: Setscrew.
 - 6. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
 - 7. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.
- C. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.02 NONMETALLIC CONDUITS AND FITTINGS

- A. Nonmetallic Conduit:
 - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - a. AFC Cable Systems; a part of Atkore International.
 - b. Anamet Electrical, Inc.
 - c. CANTEX INC.
 - d. Electri-Flex Company.

- e. <u>Kraloy</u>.
- f. <u>RACO; Hubbell</u>.
- g. Thomas & Betts Corporation; A Member of the ABB Group.
- 2. Listing and Labeling: Nonmetallic conduit shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- 3. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- 4. LFNC: Comply with UL 1660.
- B. Nonmetallic Fittings:
 - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - a. AFC Cable Systems; a part of Atkore International.
 - b. <u>CANTEX INC</u>.
 - c. Condux International, Inc.
 - d. Electri-Flex Company.
 - e. Kraloy.
 - f. RACO; Hubbell.
 - g. Thomas & Betts Corporation; A Member of the ABB Group.
 - 2. Fittings, General: Listed and labeled for type of conduit, location, and use.
 - 3. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
 - a. Fittings for LFNC: Comply with UL 514B.
 - 4. Solvents and Adhesives: As recommended by conduit manufacturer.

2.03 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - 1. <u>B-line, an Eaton business</u>.
 - 2. Hoffman; a brand of Pentair Equipment Protection.
 - 3. <u>Square D</u>.
- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.
 - 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Screw-cover type unless otherwise indicated.
- E. Finish: Manufacturer's standard enamel finish.

2.04 SURFACE RACEWAYS

- A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Architect.
 - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - a. <u>Hubbell Incorporated; Wiring Device-Kellems</u>.
 - b. Panduit Corp.
 - c. <u>Wiremold / Legrand</u>.
- C. Surface Nonmetallic Raceways: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors. Product shall comply with UL 94 V-0 requirements for self-extinguishing characteristics.
 - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - a. <u>Hubbell Incorporated</u>.
 - b. Panduit Corp.
 - c. <u>Wiremold / Legrand</u>.

2.05 BOXES, ENCLOSURES, AND CABINETS

- A. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - 1. Crouse-Hinds, an Eaton business.
 - 2. EGS/Appleton Electric.
 - 3. Erickson Electrical Equipment Company.
 - 4. <u>FSR Inc</u>.
 - 5. Hoffman; a brand of Pentair Equipment Protection.
 - 6. <u>Hubbell Incorporated</u>.
 - 7. Hubbell Incorporated; Wiring Device-Kellems.
 - 8. Kraloy.
 - 9. Milbank Manufacturing Co.
 - 10. Oldcastle Enclosure Solutions.
 - 11. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - 12. Plasti-Bond.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- E. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.
- F. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb (32 kg).
 - 1. Listing and Labeling: Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- H. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- I. Device Box Dimensions: 4-11/16 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).
- J. Gangable boxes are allowed.
- K. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- L. Cabinets:
 - 1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 2. Hinged door in front cover with flush latch and concealed hinge.
 - 3. Key latch to match panelboards.
 - 4. Metal barriers to separate wiring of different systems and voltage.
 - 5. Accessory feet where required for freestanding equipment.
 - 6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.06 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. General Requirements for Handholes and Boxes:
 - 1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
 - 2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.
 - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - a. Armorcast Products Company.
 - b. <u>NewBasis</u>.
 - c. Oldcastle Enclosure Solutions.
 - d. Oldcastle Precast, Inc.
 - e. Quazite: Hubbell Power Systems, Inc.
 - f. Christy
 - 2. Standard: Comply with SCTE 77.
 - 3. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
 - 4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
 - 5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 - 6. Cover Legend: Molded lettering.
 - 7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
- C. Fiberglass Handholes and Boxes: Molded of fiberglass-reinforced polyester resin, with frame and covers of [polymer concrete] [reinforced concrete] [cast iron] [hot-dip galvanized-steel diamond plate] [fiberglass].
 - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - a. Armorcast Products Company.
 - b. <u>NewBasis</u>.
 - c. Nordic Fiberglass, Inc.
 - d. Oldcastle Enclosure Solutions.
 - e. Oldcastle Enclosure Solutions.
 - f. Oldcastle Precast, Inc.
 - g. Quazite: Hubbell Power Systems, Inc.
 - h. Christy.

- 2. Standard: Comply with SCTE 77.
- 3. Color of Frame and Cover: Gray.
- 4. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
- 5. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
- 6. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
- 7. Cover Legend: Molded lettering.
- 8. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
- 9. Handholes 12 Inches Wide by 24 Inches Long (300 mm Wide by 600 mm Long) and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

PART 3 EXECUTION

3.01 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed Conduit: GRC.
 - 2. Concealed Conduit, Aboveground: EMT.
 - 3. Underground Conduit: RNC, Type EPC-40-PVC.
 - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 - 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed, Not Subject to Physical Damage: EMT.
 - 2. Exposed, Not Subject to Severe Physical Damage: EMT.
 - 3. Exposed and Subject to Severe Physical Damage: GRC.
 - 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 - 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 - 6. Damp or Wet Locations: GRC, IMC, EMT.
 - 7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.
- C. Minimum Raceway Size: 1/2-inch (16-mm) trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.

- 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
- 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
- 3. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
- 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Do not install aluminum conduits, boxes, or fittings.
- F. Install surface raceways only where indicated on Drawings.
- G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

3.02 INSTALLATION

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.
- D. Do not fasten conduits onto the bottom side of a metal deck roof.
- E. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- F. Complete raceway installation before starting conductor installation.
- G. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- H. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.

- I. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- J. Support conduit within 12 inches (300 mm) of enclosures to which attached.
- K. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot (3-m) intervals.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - 3. Arrange raceways to keep a minimum of 1 inch (25 mm) of concrete cover in all directions.
 - 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
- L. Stub-Ups to Above Recessed Ceilings:
 - 1. Use EMT, IMC, or RMC for raceways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- M. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- N. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- O. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- P. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- Q. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- R. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

- S. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- T. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- U. Surface Raceways:
 - 1. Install surface raceway with a minimum 2-inch (50-mm) radius control at bend points.
 - Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches (1200 mm) and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- V. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
- W. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where an underground service raceway enters a building or structure.
 - 3. Conduit extending from interior to exterior of building.
 - 4. Conduit extending into pressurized duct and equipment.
 - 5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
 - 6. Where otherwise required by NFPA 70.
- X. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- Y. Expansion-Joint Fittings:
 - Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C) and that has straight-run length that exceeds 25 feet (7.6 m). Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F (55 deg C) and that has straight-run length that exceeds 100 feet (30 m).

- 2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
 - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
 - d. Attics: 135 deg F (75 deg C) temperature change.

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- 3. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
- 4. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- Z. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
 - 1. Use LFMC in damp or wet locations subject to severe physical damage.
- AA. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- BB. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
- CC. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- DD. Locate boxes so that cover or plate will not span different building finishes.
- EE. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- FF. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- GG.Set metal floor boxes level and flush with finished floor surface.

HH. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.03 INSTALLATION OF UNDERGROUND CONDUIT

- A. Direct-Buried Conduit:
 - 1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches (150 mm) in nominal diameter.
 - 2. Install backfill as specified in Section 312000 "Earth Moving."
 - 3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."
 - 4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete for a minimum of 12 inches (300 mm) on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
 - 5. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.04 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch (12.5-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch (25 mm) above finished grade.

3.05 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install 0sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.06 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 072700 "Firestopping."

3.07 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 26 05 33

SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING SECTION 26 05 44

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
 - 2. Sleeve-seal systems.
 - 3. Sleeve-seal fittings.
 - 4. Grout.
 - 5. Silicone sealants.
- B. Related Requirements:
 - 1. Section 072700 "Firestopping" for penetration firestopping installed in fireresistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 PRODUCTS

2.01 SLEEVES

- A. Wall Sleeves:
 - 1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
 - Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

- C. Sleeves for Rectangular Openings:
 - 1. Material: Galvanized sheet steel.
 - 2. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
 - b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.02 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
- B. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - 1. Advance Products & Systems, Inc.
 - 2. CALPICO, Inc.
 - 3. Metraflex Company (The).
 - 4. Pipeline Seal and Insulator, Inc.
 - 5. Proco Products, Inc.

2.03 SLEEVE-SEAL FITTINGS

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.
- B. <u>Manufacturers:</u> 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. <u>HOLDRITE</u>.

2.04 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volumeadjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.05 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
 - 2. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 EXECUTION

3.01 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
 - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
 - Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
 - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.

- 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.02 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-ongrade at raceway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.03 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. 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.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 26 05 44

IDENTIFICATION FOR ELECTRICAL SYSTEMS SECTION 26 05 53

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Identification for raceways.
 - 2. Identification of power and control cables.
 - 3. Identification for conductors.
 - 4. Underground-line warning tape.
 - 5. Warning labels and signs.
 - 6. Instruction signs.
 - 7. Equipment identification labels.
 - 8. Miscellaneous identification products.

1.03 ACTION SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.04 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.05 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 PRODUCTS

2.01 POWER AND CONTROL RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field .
 - 2. Legend: Indicate voltage and system or service type.
- C. Colors for Raceways Carrying Circuits at More Than 600 V:
 - 1. Black letters on an orange field.
 - 2. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING."
- D. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
- E. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- F. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

- G. Tape and Stencil for Raceways Carrying Circuits More Than 600 V: 4-inch-(100-mm-) wide black stripes on 10-inch (250-mm) centers diagonally over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stop stripes at legends.
- H. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking cable tie fastener.

2.02 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.
- B. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
- C. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted , 3-mil- (0.08mm-) thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the cable diameter such that the clear shield overlaps the entire printed legend.
- D. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machineprinted identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 deg F (93 deg C). Comply with UL 224.
- E. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking cable tie fastener.
- F. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of cable it identifies and to stay in place by gripping action.

2.03 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.
- B. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted , 3-mil- (0.08mm-) thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the conductor diameter such that the clear shield overlaps the entire printed legend.

- C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of conductor it identifies and to stay in place by gripping action.
- D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve with diameter sized to suit diameter of conductor it identifies and to stay in place by gripping action.
- E. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.04 FLOOR MARKING TAPE

A. 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.05 UNDERGROUND-LINE WARNING TAPE

- A. Tape:
 - 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
 - 2. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - 3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
- B. Color and Printing:
 - 1. Comply with ANSI Z535.1 through ANSI Z535.5.
 - 2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE, .
 - 3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE,
- C. Tag: Type I:
 - 1. Pigmented polyolefin, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
 - 2. Thickness: 4 mils (0.1 mm).
 - 3. Weight: 18.5 lb/1000 sq. ft. (9.0 kg/100 sq. m).
 - 4. 3-Inch (75-mm) Tensile According to ASTM D 882: 30 lbf (133.4 N), and 2500 psi (17.2 MPa).
- D. Tag: Type II :
 - 1. Multilayer laminate consisting of high-density polyethylene scrim coated with pigmented polyolefin, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.

- 2. Thickness: 12 mils (0.3 mm).
- 3. Weight: 36.1 lb/1000 sq. ft. (17.6 kg/100 sq. m).
- 4. 3-Inch (75-mm) Tensile According to ASTM D 882: 400 lbf (1780 N), and 11,500 psi (79.2 MPa).
- E. Tag: Type ID :
 - 1. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
 - 2. Overall Thickness: 5 mils (0.125 mm).
 - 3. Foil Core Thickness: 0.35 mil (0.00889 mm).
 - 4. Weight: 28 lb/1000 sq. ft. (13.7 kg/100 sq. m).
 - 5. 3-Inch (75-mm) Tensile According to ASTM D 882: 70 lbf (311.3 N), and 4600 psi (31.7 MPa).
- F. Tag: Type IID :
 - Reinforced, detectable three-layer laminate, consisting of a printed pigmented woven scrim, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, brightcolored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
 - 2. Overall Thickness: 8 mils (0.2 mm).
 - 3. Foil Core Thickness: 0.35 mil (0.00889 mm).
 - 4. Weight: 34 lb/1000 sq. ft. (16.6 kg/100 sq. m).
 - 5. 3-Inch ((75-mm))Tensile According to ASTM D 882: 300 lbf (1334 N), and 12,500 psi (86.1 MPa).

2.06 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Baked-Enamel Warning Signs:
 - 1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
 - 2. 1/4-inch (6.4-mm) grommets in corners for mounting.
 - 3. Nominal size, 7 by 10 inches (180 by 250 mm).
- D. Warning label and sign shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."

2. Workspace Clearance Warning: "WARNING - OSHA REGULATION -AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

2.07 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. inches (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.
 - 1. Engraved legend with black letters on white face .
 - 2. Punched or drilled for mechanical fasteners.
 - 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.
- B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).
- C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

2.08 EQUIPMENT IDENTIFICATION LABELS

- A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).
- B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.
- C. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).
- D. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

2.09 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).

- 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
- 4. Color: Black except where used for color-coding.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one piece, self locking, Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black.
- C. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 deg F ((23 deg C)), According to ASTM D 638: 7000 psi (48.2 MPa).
 - 3. UL 94 Flame Rating: 94V-0.
 - 4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
 - 5. Color: Black.

2.10 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.

- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape with adhesive appropriate to the location and substrate.
- G. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.
- H. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.
- I. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
 - 1. Outdoors: UV-stabilized nylon.
 - 2. In Spaces Handling Environmental Air: Plenum rated.
- J. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (400 mm) overall.
- K. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.02 IDENTIFICATION SCHEDULE

- A. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil 4-inch- (100-mm-) wide black stripes on 10-inch (250-mm) centers over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stencil legend "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch- (75-mm-) high black letters on 20-inch (500mm) centers. Stop stripes at legends. Apply to the following finished surfaces:
 - 1. Floor surface directly above conduits running beneath and within 12 inches (300 mm) of a floor that is in contact with earth or is framed above unexcavated space.
 - 2. Wall surfaces directly external to raceways concealed within wall.

- 3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.
- B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
 - 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.
 - a. Color shall be factory applied.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - c. Colors for 480/277-V Circuits:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- C. Power-Circuit Conductor Identification, More than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use nonmetallic plastic tag holder with adhesive-backed phase tags, and a separate tag with the circuit designation.
- D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- E. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive, self-laminating polyester labels with the conductor or cable designation, origin, and destination.
- F. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.
- G. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
 - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.

- 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- H. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
 - 1. Limit use of underground-line warning tape to direct-buried cables.
 - 2. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- I. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- J. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Baked-enamel warning signs .
 - 1. Comply with 29 CFR 1910.145.
 - 2. Identify system voltage with black letters on an orange background.
 - 3. Apply to exterior of door, cover, or other access.
 - 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
- K. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- L. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer <Insert emergency operations>.
- M. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 - 1. Labeling Instructions:
 - a. Indoor Equipment: Adhesive film label Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.

- b. Outdoor Equipment: Engraved, laminated acrylic or melamine label .
- c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
- d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
- 2. Equipment to Be Labeled:
 - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved, laminated acrylic or melamine label.
 - b. Enclosures and electrical cabinets.
 - c. Access doors and panels for concealed electrical items.
 - d. Switchgear.
 - e. Switchboards.
 - f. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
 - g. Emergency system boxes and enclosures.
 - h. Enclosed switches.
 - i. Enclosed circuit breakers.
 - j. Enclosed controllers.
 - k. Variable-speed controllers.
 - I. Push-button stations.
 - m. Power transfer equipment.
 - n. Contactors.
 - o. Remote-controlled switches, dimmer modules, and control devices.
 - p. Battery-inverter units.
 - q. Battery racks.
 - r. Monitoring and control equipment.

END OF SECTION 26 05 53
LIGHTING CONTROL DEVICES SECTION 26 09 23

PART1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Indoor occupancy and vacancy sensors.
 - 2. Switchbox-mounted occupancy sensors.
 - 3. Standalone daylight-harvesting switching and dimming controls.
- B. Related Requirements:
 - 1. Section 262726 "Wiring Devices" for wall-box dimmers, non-networkable wall-switch occupancy sensors, and manual light switches.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.04 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lighting control device to include in operation and maintenance manuals.

1.05 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace lighting control devices that fail(s) in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Faulty operation of lighting control software.
 - b. Faulty operation of lighting control devices.
 - 2. Warranty Period: Two year(s) from date of Substantial Completion.

PART 2 PRODUCTS

2.01 INDOOR OCCUPANCY AND VACANCY SENSORS

- A. General Requirements for Sensors:
 - 1. Ceiling mounted, solid-state indoor occupancy and vacancy sensors.
 - 2. Passive infrared and Ultrasonic Dual technology.

- 3. Integrated and Separate power pack.
- 4. Hardwired connection to switch.
- 5. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- 6. Operation:
 - a. Occupancy Sensor: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 20 minutes.
 - b. Vacancy Sensor: Unless otherwise indicated, lights are manually turned on and sensor turns lights off when the room is unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 20 minutes.
 - c. Combination Sensor: Unless otherwise indicated, sensor shall be programmed to turn lights on when coverage area is occupied and turn them off when unoccupied, or to turn off lights that have been manually turned on; with a time delay for turning lights off, adjustable over a minimum range of 1 to 20 minutes.
- 7. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Relay: Externally mounted through a 1/2-inch (13-mm) knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
- 8. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.

2.02 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

- A. General Requirements for Sensors: Automatic-wall-switch occupancy sensor with manual on-off switch, suitable for mounting in a single gang switchbox.
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application and shall comply with California Title 24.
 - 2. Occupancy Sensor Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn lights off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 - 3. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F (0 to 49 deg C).

2.03 DAYLIGHT-HARVESTING DIMMING CONTROLS

- A. System Description: Sensing daylight and electrical lighting levels, the system adjusts the indoor electrical lighting levels. As daylight increases, the lights are dimmed.
 - 1. Lighting control set point is based on two lighting conditions:
 - a. When no daylight is present (target level).
 - b. When significant daylight is present.
 - 2. System programming is done with two hand-held, remote-control tools.
 - a. Initial setup tool.
 - b. Tool for occupants to adjust the target levels by increasing the set point up to 25 percent, or by minimizing the electric lighting level.
- B. Ceiling-Mounted Dimming Controls: Solid-state, light-level sensor unit to detect changes in indoor lighting levels that are perceived by the eye.
- C. Electrical Components, Devices, and Accessories:
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Sensor Output: 0- to 10-V dc to operate luminaires. Sensor is powered by controller unit.
 - 3. Light-Level Sensor Set-Point Adjustment Range: 20 to 60 fc (120 to 640 lux).

2.04 EXAMINATION

- A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.
- B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

2.05 SENSOR INSTALLATION

- A. Comply with NECA 1.
- B. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
- C. Install and aim sensors in locations to achieve not less than 90-percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

2.06 WIRING INSTALLATION

- A. Comply with NECA 1.
- B. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch (13 mm).
- C. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- D. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
- E. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

2.07 IDENTIFICATION

A. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."

2.08 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Lighting control devices will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

2.09 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

2.10 DEMONSTRATION

A. maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION 26 09 23

SWITCHBOARDS SECTION 26 24 13

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Service and distribution switchboards rated 600 V and less.
 - 2. Overcurrent protective devices.
 - 3. Identification.
- B. Related Requirements
 - 1. Section 260573.19 "Arc-Flash Hazard Analysis" for arc-flash analysis and arc-flash label requirements.

1.03 ACTION SUBMITTALS

- A. Product Data: For each switchboard, overcurrent protective device, accessory, and component.
 - 1. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
- B. Shop Drawings: For each switchboard and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types for types other than NEMA 250, Type 1.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Detail short-circuit current rating of switchboards and overcurrent protective devices.
 - 5. Detail utility company's metering provisions with indication of approval by utility company.
- C. Delegated Design Submittal:
 - 1. For arc-flash labels.

1.04 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For switchboards and components to include in emergency, operation, and maintenance manuals.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver switchboards in sections or lengths that can be moved past obstructions in delivery path.
- B. Remove loose packing and flammable materials from inside switchboard.

1.06 FIELD CONDITIONS

A. Installation Pathway: Remove and replace access fencing, doors, lift-out panels, and structures to provide pathway for moving switchboards into place.

1.07 COORDINATION

- A. Coordinate layout and installation of switchboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

1.08 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace switchboard enclosures, buswork, overcurrent protective devices, accessories, and factory installed interconnection wiring that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: One year from date of Substantial Completion.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Switchboards shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation. Shake-table testing shall comply with ICC-ES AC156.
 - The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.02 SWITCHBOARDS

- A. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - 1. <u>Eaton</u>.
 - 2. General Electric Company.
 - 3. SIEMENS Industry, Inc.; Energy Management Division.
 - 4. Square D; by Schneider Electric.
- B. Source Limitations: Obtain switchboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for switchboards including clearances between switchboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- D. 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.
- E. Comply with NEMA PB 2.
- F. Comply with NFPA 70.
- G. Comply with UL 891.
- H. Front-Connected, Front-Accessible Switchboards:
 - 1. Main Devices: Fixed, individually mounted.
 - 2. Branch Devices: Panel mounted.
 - 3. Sections front and rear aligned.
- Seismic Requirements: Fabricate and test switchboards according to IEEE 344 to withstand seismic forces defined in Section 260548.16 "Seismic Controls for Electrical Systems."
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation. Shake-table testing shall comply with ICC-ES AC156.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
 - b. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

- J. Outdoor Enclosures: Type 3R.
 - 1. Finish: Factory-applied finish in manufacturer's standard color; undersurfaces treated with corrosion-resistant undercoating.
 - 2. Enclosure: Flat roof; bolt-on rear covers for each section, with provisions for padlocking.
 - 3. Power for space heaters, ventilation, lighting, and receptacle provided by a remote source.
- K. Barriers: Between adjacent switchboard sections.
- L. Service Entrance Rating: Switchboards intended for use as service entrance equipment shall contain one service disconnecting means with overcurrent protection, a neutral bus with disconnecting link, a grounding electrode conductor terminal, and a main bonding jumper.
- M. Utility Metering Compartment: Barrier compartment and section complying with utility company's requirements; hinged sealable door; buses provisioned for mounting utility company's current transformers and potential transformers or potential taps as required by utility company. If separate vertical section is required for utility metering, match and align with basic switchboard. Provide service entrance label and necessary applicable service entrance features.
- N. Bus Transition and Incoming Pull Sections: Matched and aligned with basic switchboard.
- O. Hinged Front Panels: Allow access to circuit breaker, metering, accessory, and blank compartments.
- P. Buses and Connections: Three phase, four wire unless otherwise indicated.
 - 1. Provide phase bus arrangement A, B, C from front to back, top to bottom, and left to right when viewed from the front of the switchboard.
 - 2. Phase- and Neutral-Bus Material: Hard-drawn copper of 98 percent conductivitiy.
 - 3. Retain one of first two subparagraphs below for circuit-breaker line connection material. Copper connections from aluminum bus are not usually available.
 - 4. Copper feeder circuit-breaker line connections.
 - 5. Ground Bus: 1/4-by-2-inch- (6-by-50-mm-) hard-drawn copper of 98 percent conductivity, equipped with mechanical connectors for feeder and branch-circuit ground conductors.
 - 6. Main-Phase Buses and Equipment-Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. Provide for future extensions from both ends.
 - 7. Disconnect Links:
 - a. Isolate neutral bus from incoming neutral conductors.
 - b. Bond neutral bus to equipment-ground bus for switchboards utilized as service equipment or separately derived systems.

- 8. Neutral Buses: 100 percent of the ampacity of phase buses unless otherwise indicated, equipped with connectors for outgoing circuit neutral cables. Brace bus extensions for busway feeder neutral bus.
- 9. Isolation Barrier Access Provisions: Permit checking of bus-bolt tightness.
- Q. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment.

2.03 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
 - 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for lowlevel overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 2. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
 - 3. MCCB Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor material.
 - c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
- B. Fuses are specified in Section 262813 "Fuses."

2.04 IDENTIFICATION

- A. Presentation Media: Painted graphics in color contrasting with background color to represent bus and components, complete with lettered designations.
- B. Service Equipment Label: NRTL labeled for use as service equipment for switchboards with one or more service disconnecting and overcurrent protective devices.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Receive, inspect, handle, and store switchboard.
 - 1. Lift or move panelboards with spreader bars and manufacturer-supplied lifting straps following manufacturer's instructions.
 - 2. Use rollers, slings, or other manufacturer-approved methods if lifting straps are not furnished.
 - 3. Protect from moisture, dust, dirt, and debris during storage and installation.

- 4. Install temporary heating during storage per manufacturer's instructions.
- B. Examine switchboards before installation. Reject switchboards that are moisture damaged or physically damaged.
- C. Examine elements and surfaces to receive switchboards for compliance with installation tolerances and other conditions affecting performance of the Work or that affect the performance of the equipment.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install switchboards and accessories according to NECA 400 or NEMA PB 2.1.
- B. Equipment Mounting: Install switchboards on concrete base, 4-inch (100-mm) nominal thickness.
 - 1. Install conduits entering underneath the switchboard, entering under the vertical section where the conductors will terminate. Install with couplings flush with the concrete base. Extend 2 inches (50-mm) above concrete base after switchboard is anchored in place.
 - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
 - 3. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 4. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 5. Install anchor bolts to elevations required for proper attachment to switchboards.
 - 6. Anchor switchboard to building structure at the top of the switchboard if required or recommended by the manufacturer.
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, straps and brackets, and temporary blocking of moving parts from switchboard units and components.
- D. Comply with mounting and anchoring requirements for seismic Controls.
- E. Operating Instructions: Frame and mount the printed basic operating instructions for switchboards, including control and key interlocking sequences and emergency procedures. Fabricate frame of finished wood or metal and cover instructions with clear acrylic plastic. Mount on front of switchboards.

- F. Install filler plates in unused spaces of panel-mounted sections.
- G. Install overcurrent protective devices.
- H. Comply with NECA 1.

3.03 CONNECTIONS

- A. Bond conduits entering underneath the switchboard to the equipment ground bus with a bonding conductor sized per NFPA 70.
- B. Support and secure conductors within the switchboard according to NFPA 70.
- C. Extend insulated equipment grounding cable to busway ground connection and support cable at intervals in vertical run.

3.04 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with requirements for identification.
- B. Switchboard Nameplates: Label each switchboard compartment with a nameplate complying with requirements for identification
- C. Device Nameplates: Label each disconnecting and overcurrent protective device and each meter and control device mounted in compartment doors with a nameplate complying with requirements for identification.

3.05 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

3.06 PROTECTION

A. Temporary Heating: Apply temporary heat, to maintain temperature according to manufacturer's written instructions, until switchboard is ready to be energized and placed into service.

END OF SECTION 26 24 13

PANELBOARDS SECTION 26 24 16

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Distribution panelboards.
 - 2. Lighting and appliance branch-circuit panelboards.

1.03 DEFINITIONS

- A. SVR: Suppressed voltage rating.
- B. TVSS: Transient voltage surge suppressor.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types and details for types other than NEMA 250, Type 1.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of panelboards and overcurrent protective devices.
 - 5. Include evidence of NRTL listing for series rating of installed devices.
 - 6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 7. Include wiring diagrams for power, signal, and control wiring.
 - Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Seismic Qualification Certificates: Submit certification that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces defined in Section 260548.16 "Seismic Controls for Electrical Systems." Include the following:
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field Quality-Control Reports:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- D. Panelboard Schedules: For installation in panelboards. Breaker arrangement shall be as shown on panel schedules on electrical plans. No deviation is permitted without engineer's approval.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 - 2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.07 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. Keys: 4 spares for each type of panelboard cabinet lock.

1.08 QUALITY ASSURANCE

A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- 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 NEMA PB 1.
- E. Comply with NFPA 70.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.
- B. Handle and prepare panelboards for installation according to NECA 407.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations:
 - Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 - 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - Ambient Temperature: Not exceeding minus 22 deg F (minus 30 deg C) to plus 104 deg F (plus 40 deg C).
 - b. Altitude: Not exceeding 6600 feet (2000 m).
- B. Service Conditions: NEMA PB 1, usual service conditions, as follows:
 - 1. Ambient temperatures within limits specified.
 - 2. Altitude not exceeding 6600 feet (2000 m).

1.11 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

1.12 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Section 260548.16 "Seismic Controls for Electrical Systems."
- B. Enclosures: Flush- and surface-mounted cabinets.
 - 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1 .
 - b. Outdoor Locations: NEMA 250, Type 3R .
 - 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
 - 3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
 - 4. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
 - 5. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
 - 6. Finishes:
 - a. Panels and Trim: Steel and field painted as directed by architect.,
 - b. Back Boxes: Same finish as panels and trim.
 - c. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components.
 - 7. Directory Card: Inside panelboard door, mounted in metal frame with transparent protective cover.
- C. Phase, Neutral, and Ground Buses:
 - 1. Material: Hard-drawn copper, 98 percent conductivity. Five subparagraphs below are optional features. Ground and neutral buses in lighting and appliance panelboards are also referred to as "bars" in manufacturers' literature. Coordinate with Drawings.

- 2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
- D. Conductor Connectors: Suitable for use with conductor material and sizes.
 - 1. Material: Hard-drawn copper, 98 percent conductivity
 - 2. Main and Neutral Lugs: Mechanical type.
 - 3. Ground Lugs and Bus-Configured Terminators: Mechanical type.
 - 4. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
 - 5. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
 - 6. Gutter-Tap Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
 - 7. Extra-Capacity Neutral Lugs: Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.
- E. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
- F. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.02 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
- B. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 1.

2.03 DISTRIBUTION PANELBOARDS

- A. Distribution panelboards, as specified in this article, fall under requirements of "Power Panelboards" in NFPA 70.
- B. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Sector; Eaton Corporation.
 - 2. <u>General Electric Company</u>.
 - 3. Schneider Electric USA, Inc.
 - 4. Siemens Industry, Inc.
 - 5. <u>Square D</u>.

- C. Panelboards: NEMA PB 1, power and feeder distribution type.
- D. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
 - 1. For doors more than 36 inches (914 mm) high, provide two latches, keyed alike.
- E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
- F. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

2.04 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- B. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- C. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.05 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
 - 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for lowlevel overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 - Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time time adjustments.
 - d. Ground-fault pickup level, time delay, and I squared x t response.
 - 4. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.

- d. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.
- e. Handle Padlocking Device: Fixed attachment, for locking circuitbreaker handle in on or off position.
- f. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

2.06 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Receive, inspect, handle, and store panelboards according to NECA 407 .
- B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install panelboards and accessories according to NECA 407.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
- C. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."
- D. Mount top of trim 80 inches above finished floor unless otherwise indicated.
- E. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- F. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Set field-adjustable, circuit-breaker trip ranges.

- G. Install filler plates in unused spaces.
- H. Stub three 2-inch (27-GRC) empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Arrange conductors in gutters into groups and bundle and wrap with wire ties Feeder conductors shall be installed toward the back of enclosure, with branch circuit conductors toward the front.
- I. Comply with NECA 1.

3.03 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 260553 "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads matching panel schedules on electrical plans; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.04 FIELD QUALITY CONTROL

- A. Acceptance Testing Preparation:
 - 1. Test continuity of each circuit.
- B. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- C. Panelboards will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.05 ADJUSTING

A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.

3.06 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 26 24 16

WIRING DEVICES SECTION 26 27 26

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Twist-locking receptacles.
 - 3. Isolated-ground receptacles.
 - 4. Weather-resistant receptacles.
 - 5. Snap switches and wall-box dimmers.
 - 6. Wall-switch and exterior occupancy sensors.
 - 7. Communications outlets.
 - 8. Pendant cord-connector devices.
 - 9. Floor service outlets, poke-through assemblies, service poles, and multioutlet assemblies.

1.03 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. RFI: Radio-frequency interference.
- E. TVSS: Transient voltage surge suppressor.
- F. UTP: Unshielded twisted pair.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Receptacles for Owner-Furnished Equipment: Match plug configurations.
 - 2. Cord and Plug Sets: Match equipment requirements.

1.05 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

1.07 MAINTENANCE MATERIAL SUBMITTALS

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - 1. <u>Hubbell</u>.
 - 2. Leviton Manufacturing Co., Inc.
 - 3. Pass & Seymour/Legrand (Pass & Seymour).
- B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.02 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
 - 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
 - 2. Devices shall comply with the requirements in this Section.

2.03 STRAIGHT-BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
- B. Hospital-Grade, Duplex Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596.

- C. Isolated-Ground, Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
- D. Description: Straight blade; equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.
- E. Tamper-Resistant Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

2.04 GFCI RECEPTACLES

- A. General Description:
 - 1. Straight blade, non-feed-through type.
 - 2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
 - 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A.
- C. GFCI receptacles installed exterior of building or subject to weather shall be weather-resistant type.
- D. Hospital-Grade, Duplex GFCI Convenience Receptacles: Comply with UL 498 Supplement sd.

2.05 ISOLATED-GROUND RECEPTACLES

- A. Isolated-Ground, Duplex Convenience Receptacles:
 - 1. Description:
 - a. Straight blade, 125 V, 20 A; NEMA WD 6 Configuration 5-20R.
 - b. Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

2.06 DECORATOR-STYLE DEVICES

- A. Convenience Receptacles: Square face, 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, and UL 498.
- B. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - 1. <u>Hubbell</u>.
 - 2. Leviton Manufacturing Co., Inc.

- 3. Pass & Seymour/Legrand (Pass & Seymour).
- C. GFCI, Non-Feed-Through Type, Convenience Receptacles: Square face, 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and UL 943 Class A.
- D. Rocker Switches, Square Face, decora style 120/277 V, 15 A: Comply with NEMA WD 1, UL 20, and FS W-S-896.
- E. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
 - 1. <u>Hubbell</u>.
 - 2. Leviton Manufacturing Co., Inc.
 - 3. Pass & Seymour/Legrand (Pass & Seymour).
- F. Lighted Toggle Switches, Square Face, 120 V, 15 A: Comply with NEMA WD 1 and UL 20.
 - 1. Description: With neon-lighted handle, illuminated when switch is "off."

2.07 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material for Finished Spaces: 0.035-inch- (1-mm-) thick, satin-finished, Type 302 stainless steel .
 - 3. Material for Unfinished Spaces: Galvanized steel .
 - 4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.08 FINISHES

- A. Device Color:
 - 1. Wiring Devices Connected to Normal Power System: White unless otherwise indicated or required by NFPA 70 or device listing. Verify finish with Architect.
 - 2. Wiring Devices Connected to Emergency Power System: Red .
 - 3. Isolated-Ground Receptacles: Orange .
- B. Wall Plate Color: For plastic covers, match device color.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
 - 1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 - 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 - 4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.
- D. Device Installation:
 - 1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
 - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
 - 4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
 - 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.

- 6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
- 7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
- 8. Tighten unused terminal screws on the device.
- 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
- E. Receptacle Orientation:
 - 1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the left.
- F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- G. Dimmers:
 - 1. Install dimmers within terms of their listing.
 - 2. Verify that dimmers used for fan speed control are listed for that application.
 - 3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.
- H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.
- I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.02 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.03 IDENTIFICATION

A. Comply with Section 260553 "Identification for Electrical Systems."

3.04 FIELD QUALITY CONTROL

- A. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Using the test plug, verify that the device and its outlet box are securely mounted.

- 3. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- B. Wiring device will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 26 27 26

LED INTERIOR LIGHTING SECTION 26 51 19

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes the following types of LED luminaires:
 - 1. Cylinder.
 - 2. Downlight.
 - 3. Highbay, linear.
 - 4. Highbay, nonlinear.
 - 5. Linear industrial.
 - 6. Lowbay.
 - 7. Parking garage.
 - 8. Recessed, linear.
 - 9. Strip light.
 - 10. Surface mount, linear.
 - 11. Surface mount, nonlinear.
 - 12. Suspended, linear.
 - 13. Suspended, nonlinear.
- B. Related Requirements:
 - 1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.03 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. LED: Light-emitting diode.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Arrange in order of luminaire designation.
- 2. Include data on features, accessories, and finishes.
- 3. Include physical description and dimensions of luminaires.
- 4. Include emergency lighting units, including batteries and chargers.
- 5. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.
- B. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.
 - 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.06 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.08 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
- B. Warranty Period: one year(s) from date of Substantial Completion.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

- 1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."
- B. Ambient Temperature: 41 to 104 deg F.1. Relative Humidity: Zero to 95 percent.

2.02 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
 - 1. Label shall include the following lamp characteristics:
 - a. "USE ONLY" and include specific lamp type.
 - b. Lamp diameter, shape, size, wattage, and coating.
 - c. CCT and CRI.
- C. Recessed luminaires shall comply with NEMA LE 4.
- D. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.
- E. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
- F. California Title 24 compliant.

2.03 MATERIALS

- A. Metal Parts:
 - 1. Free of burrs and sharp corners and edges.
 - 2. Sheet metal components shall be steel unless otherwise indicated.
 - 3. Form and support to prevent warping and sagging.
- B. Steel:
 - 1. ASTM A 36/A 36M for carbon structural steel.
 - 2. ASTM A 568/A 568M for sheet steel.
- C. Stainless Steel:
 - 1. 1. Manufacturer's standard grade.
 - 2. 2. Manufacturer's standard type, ASTM A 240/240 M.
- D. Galvanized Steel: ASTM A 653/A 653M.

E. Aluminum: ASTM B 209.

2.04 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.05 LUMINAIRE SUPPORT

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.
- C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).
- D. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.
- E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 TEMPORARY LIGHTING

A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

3.03 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Install lamps in each luminaire.
- D. Supports:
 - 1. Sized and rated for luminaire weight.
 - 2. Able to maintain luminaire position after cleaning and relamping.
 - 3. Provide support for luminaire without causing deflection of ceiling or wall.
 - 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
- E. Flush-Mounted Luminaires:
 - 1. Secured to outlet box.
 - 2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
 - 3. Trim ring flush with finished surface.
- F. Wall-Mounted Luminaires:
 - 1. Attached to structural members in walls Attached using through bolts and backing plates on either side of wall.
 - 2. Do not attach luminaires directly to gypsum board.
- G. Suspended Luminaires:
 - 1. Ceiling Mount:
 - a. Two 5/32-inch- (4-mm-) diameter aircraft cable supports adjustable to height as indicated on plans.
 - 2. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and stainless steel cable support for suspension for each unit length of luminaire chassis, including one at each end.
 - 3. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.
- H. Ceiling-Grid-Mounted Luminaires:
 - 1. Secure to any required outlet box.
 - 2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.
 - 3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

I. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.04 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.05 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
 - 2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 26 51 19

LED EXTERIOR LIGHTING SECTION 26 56 19

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Exterior solid-state luminaires that are designed for and exclusively use LED lamp technology.
 - 2. Luminaire supports.
- B. Related Requirements:
 - 1. Section 265613 "Lighting Poles and Standards" for poles and standards used to support exterior lighting equipment.

1.03 **DEFINITIONS**

- A. CCT: Correlated color temperature.
- B. CRI: Color rendering index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. Lumen: Measured output of lamp and luminaire, or both.
- F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of luminaire.
 - 1. Arrange in order of luminaire designation.
 - 2. Include data on features, accessories, and finishes.
 - 3. Include physical description and dimensions of luminaire.
 - 4. Lamps, include life, output (lumens, CCT, and CRI), and energy-efficiency data.
 - 5. Wiring diagrams for power, control, and signal wiring.
 - 6. Photoelectric relays.
 - 7. Means of attaching luminaires to supports and indication that the attachment is suitable for components involved.

B. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires to include in operation and maintenance manuals.
 - 1. Provide a list of all lamp types used on Project. Use ANSI and manufacturers' codes.

1.06 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturers' laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products and complying with applicable IES testing standards.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering prior to shipping.

1.08 FIELD CONDITIONS

- A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.
- B. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

1.09 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures, including luminaire support components.
 - b. Faulty operation of luminaires and accessories.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: 2 year(s) from date of Substantial Completion.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Seismic Performance: Luminaires and lamps shall be labeled vibration and shock resistant.
 - 1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

2.02 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.
- C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
- D. UL Compliance: Comply with UL 1598 and listed for wet location.
- E. Bulb shape complying with ANSI C79.1.
- F. CRI of minimum 80. CCT of 4100 K.
- G. L70 lamp life of 35,000 hours.
- H. Lamps dimmable from 100 percent to 0 percent of maximum light output.
- I. Internal driver.
- J. Lamp Rating: Lamp marked for outdoor use and in enclosed locations.
- K. Source Limitations: For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

2.03 LUMINAIRE-MOUNTED PHOTOELECTRIC RELAYS

A. Comply with UL 773 or UL 773A.
2.04 MATERIALS

- A. Metal Parts: Free of burrs and sharp corners and edges.
- B. Sheet Metal Components: Stainless steel. Form and support to prevent warping and sagging.
- C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.
- D. Diffusers and Globes:
 - 1. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - 2. Glass: Annealed crystal glass unless otherwise indicated.
 - 3. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.
- E. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- F. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
- G. Housings:
 - 1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
 - 2. Provide filter/breather for enclosed luminaires.
- H. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
 - 1. Label shall include the following lamp characteristics:
 - a. "USE ONLY" and include specific lamp type.
 - b. Lamp diameter, shape, size, wattage and coating.
 - c. CCT and CRI for all luminaires.

2.05 FINISHES

- A. Variations in Finishes: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- B. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.
- C. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 - Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20 requirements; and seal aluminum surfaces with clear, hard-coat wax.
 - Class I, Clear-Anodic Finish: AA-M32C22A41 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
 - Class I, Color-Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker), complying with AAMA 611.
- D. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - Surface Preparation: Clean surfaces to comply with SSPC-SP 1, to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
 - 2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
 - a. Color: As selected from manufacturer's standard catalog of colors.
 - b. Color: As selected by Architect from manufacturer's full range.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire electrical conduit to verify actual locations of conduit connections before luminaire installation.
- C. Examine walls, roofs, etc., for suitable conditions where luminaires will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 TEMPORARY LIGHTING

A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is substantially complete, clean luminaires used for temporary lighting and install new lamps.

3.03 GENERAL INSTALLATION REQUIREMENTS

- A. Comply with NECA 1.
- B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- C. Install lamps in each luminaire.
- D. Fasten luminaire to structural support.
- E. Supports:
 - 1. Sized and rated for luminaire weight.
 - 2. Able to maintain luminaire position after cleaning and relamping.
 - 3. Support luminaires without causing deflection of finished surface.
 - 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
- F. Wall-Mounted Luminaire Support:
 - 1. Attached to structural members in walls.
- G. Wiring Method: Install cables in raceways. Conceal raceways and cables.

- H. Install luminaires level, plumb, and square with finished grade unless otherwise indicated.
- I. Coordinate layout and installation of luminaires with other construction.
- J. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260533 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.

3.04 BOLLARD LUMINAIRE INSTALLATION:

- A. Align units for optimum directional alignment of light distribution.
 - 1. Install on concrete base with top 1" above finished grade or surface at luminaire location. Cast conduit into base, and shape base to match shape of bollard base. Finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."

3.05 INSTALLATION OF INDIVIDUAL GROUND-MOUNTED LUMINAIRES

- A. Aim as indicated on Drawings.
- B. Install on concrete base with top 1" above finished grade or surface at luminaire location. Cast conduit into base, and finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."

3.06 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch-(0.254-mm-) thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.07 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.08 FIELD QUALITY CONTROL

A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.

- B. Luminaire will be considered defective if it does not pass tests and inspections.
- C. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 26 56 19

DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM SECTION 283111

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Fire-alarm control unit.
 - 2. Notification appliances.

1.03 DEFINITIONS

- A. EMT: Electrical Metallic Tubing.
- B. FACP: Fire Alarm Control Panel.
- C. HLI: High Level Interface.
- D. NICET: National Institute for Certification in Engineering Technologies.
- E. PC: Personal computer.
- F. VESDA: Very Early Smoke-Detection Apparatus.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product, including furnished options and accessories.
 - 1. Include construction details, material descriptions, dimensions, profiles, and finishes.
 - 2. Include rated capacities, operating characteristics, and electrical characteristics.
- B. Shop Drawings: For fire-alarm system.
 - 1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - 2. Include plans, elevations, sections, details, and attachments to other work.
 - 3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.

- 4. Detail assembly and support requirements.
- 5. Include voltage drop calculations for notification-appliance circuits.
- 6. Include battery-size calculations.
- 7. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
- 8. Include performance parameters and installation details for each detector.
- 9. Include plans, sections, and elevations of heating, ventilating, and airconditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.
 - a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
 - b. Show field wiring required for HVAC unit shutdown on alarm.
 - c. Show field wiring and equipment required for HVAC unit shutdown on alarm and override by firefighters' control system.
 - d. Show field wiring and equipment required for HVAC unit shutdown on alarm and override by firefighters' smoke-evacuation system.
 - e. Locate detectors according to manufacturer's written recommendations.
- 10. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
- 11. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.
- C. General Submittal Requirements:
 - 1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
 - 2. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. Trained and certified by manufacturer in fire-alarm system design.
 - b. NICET-certified, fire-alarm technician;
 - c. Licensed or certified by authorities having jurisdiction.
- D. Delegated-Design Submittal: For notification appliances and smoke and heat detectors, in addition to submittals listed above, indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Drawings showing the location of each notification appliance and smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of the device.

- 2. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72. Calculate spacing and intensities for strobe signals and sound-pressure levels for audible appliances.
- 3. Indicate audible appliances required to produce square wave signal per NFPA 72.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Seismic Qualification Certificates: For fire-alarm control unit, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field quality-control reports.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following and deliver copies to authorities having jurisdiction:
 - a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
 - d. Riser diagram.
 - e. Device addresses.
 - f. Record copy of site-specific software.
 - g. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:
 - 1) Equipment tested.
 - 2) Frequency of testing of installed components.
 - 3) Frequency of inspection of installed components.

- 4) Requirements and recommendations related to results of maintenance.
- 5) Manufacturer's user training manuals.
- h. Manufacturer's required maintenance related to system warranty requirements.
- i. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.
- B. Software and Firmware Operational Documentation:
 - 1. Software operating and upgrade manuals.
 - 2. Program Software Backup: On magnetic media or compact disk, complete with data files.
 - 3. Device address list.
 - 4. Printout of software application and graphic screens.

1.07 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. Lamps for Remote Indicating Lamp Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
 - 2. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
 - 3. Smoke Detectors, Fire Detectors: Quantity equal to 10 percent of amount of each type installed, but no fewer than one unit of each type.
 - 4. Detector Bases: Quantity equal to 2 percent of amount of each type installed, but no fewer than one unit of each type.
 - 5. Keys and Tools: One extra set for access to locked or tamperproofed components.
 - 6. Audible and Visual Notification Appliances: One of each type installed.
 - 7. Fuses: Two of each type installed in the system. Provide in a box or cabinet with compartments marked with fuse types and sizes.
 - 8. Filters for Air-Sampling Detectors: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
 - 9. Air-Sampling Fan: Quantity equal to one for every five detectors, but no fewer than one unit of each type.

1.08 QUALITY ASSURANCE

- A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
- B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm technician.

- C. NFPA Certification: Obtain certification according to NFPA 72 by an NRTL (nationally recognized testing laboratory).
- D. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.
- E. NFPA Certification: Obtain certification according to NFPA 72 in the form of a placard by an FM Global-approved alarm company.
- F. NFPA Certification: Obtain certification according to NFPA 72.

1.09 PROJECT CONDITIONS

- A. Perform a full test of the existing system prior to starting work. Document any equipment or components not functioning as designed.
- B. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
 - 1. Notify Owner no fewer than seven days in advance of proposed interruption of fire-alarm service.
 - 2. Do not proceed with interruption of fire-alarm service without Owner's written permission.
- C. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

1.10 SEQUENCING AND SCHEDULING

- A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service, and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.
- B. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

- A. Source Limitations for Fire-Alarm System and Components: Components shall be compatible with, and operate as an extension of, existing system. Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.
- B. Noncoded, UL-certified addressable system, with multiplexed signal transmission and horn/strobe evacuation.
- C. Automatic sensitivity control of certain smoke detectors.
- D. All components provided shall be listed for use with the selected system.
- E. 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.

2.02 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices and systems:
 - 1. Manual stations.
 - 2. Heat detectors.
 - 3. Flame detectors.
 - 4. Smoke detectors.
 - 5. Duct smoke detectors.
 - 6. Air-sampling smoke-detection system (VESDA).
 - 7. Carbon monoxide detectors.
 - 8. Combustible gas detectors.
 - 9. Automatic sprinkler system water flow.
 - 10. Preaction system.
 - 11. Fire-extinguishing system operation.
 - 12. Fire standpipe system.
 - 13. Dry system pressure flow switch.
 - 14. Fire pump running.
- B. Fire-alarm signal shall initiate the following actions:
 - 1. Continuously operate alarm notification appliances, including voice evacuation notices.
 - 2. Identify alarm and specific initiating device at fire-alarm control unit, connected network control panels, off-premises network control panels, and remote annunciators.
 - 3. Transmit an alarm signal to the remote alarm receiving station.
 - 4. Unlock electric door locks in designated egress paths.

- 5. Release fire and smoke doors held open by magnetic door holders.
- 6. Activate voice/alarm communication system.
- 7. Switch heating, ventilating, and air-conditioning equipment controls to firealarm mode.
- 8. Activate smoke-control system (smoke management) at firefighters' smoke-control system panel.
- 9. Activate stairwell and elevator-shaft pressurization systems.
- 10. Close smoke dampers in air ducts of designated air-conditioning duct systems.
- 11. Activate preaction system.
- 12. Recall elevators to primary or alternate recall floors.
- 13. Activate elevator power shunt trip.
- 14. Activate emergency lighting control.
- 15. Activate emergency shutoffs for gas and fuel supplies.
- 16. Record events in the system memory.
- 17. Record events by the system printer.
- 18. Indicate device in alarm on the graphic annunciator.
- C. Supervisory signal initiation shall be by one or more of the following devices and actions:
 - 1. Valve supervisory switch.
 - 2. High- or low-air-pressure switch of a dry-pipe or preaction sprinkler system.
 - 3. Alert and Action signals of air-sampling detector system.
 - 4. Elevator shunt-trip supervision.
 - 5. Fire pump running.
 - 6. Fire-pump loss of power.
 - 7. Fire-pump power phase reversal.
 - 8. Independent fire-detection and -suppression systems.
 - 9. User disabling of zones or individual devices.
 - 10. Loss of communication with any panel on the network.
- D. System trouble signal initiation shall be by one or more of the following devices and actions:
 - 1. Open circuits, shorts, and grounds in designated circuits.
 - 2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
 - 3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
 - 4. Loss of primary power at fire-alarm control unit.
 - 5. Ground or a single break in internal circuits of fire-alarm control unit.
 - 6. Abnormal ac voltage at fire-alarm control unit.
 - 7. Break in standby battery circuitry.
 - 8. Failure of battery charging.
 - 9. Abnormal position of any switch at fire-alarm control unit or annunciator.
 - 10. Voice signal amplifier failure.

11. Hose cabinet door open.

- E. System Supervisory Signal Actions:
 - 1. Initiate notification appliances.
 - 2. Identify specific device initiating the event at fire-alarm control unit, connected network control panels, off-premises network control panels, and remote annunciators.
 - 3. Record the event on system printer.
 - 4. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.
 - 5. Transmit system status to building management system.
 - 6. Display system status on graphic annunciator.

2.03 PERFORMANCE REQUIREMENTS

- A. Notification-Appliance Circuit:
- B. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.
 - 1. Where notification appliances provide signals to sleeping areas, the alarm signal shall be a 520-Hz square wave with an intensity 15 dB above the average ambient sound level or 5 dB above the maximum sound level, or at least 75 dBA, whichever is greater, measured at the pillow.
 - 2. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.

2.04 NOTIFICATION APPLIANCES

- A. General Requirements for Notification Appliances: Individually addressed, connected to a signaling-line circuit, equipped for mounting as indicated, and with screw terminals for system connections.
- B. General Requirements for Notification Appliances: Connected to notificationappliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.
 - 1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.
- C. Chimes, Low-Level Output: Vibrating type, 75-dBA minimum rated output.
- D. Chimes, High-Level Output: Vibrating type, 81-dBA minimum rated output.
- E. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol.

- F. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.
 - 1. Rated Light Output:
 - a. 15/30/75/110 cd, selectable in the field.
 - 2. Mounting: Wall mounted unless otherwise indicated.
 - 3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
 - 4. Flashing shall be in a temporal pattern, synchronized with other units.
 - 5. Strobe Leads: Factory connected to screw terminals.
- G. Voice/Tone Notification Appliances:
 - 1. Comply with UL 1480.
 - 2. Speakers for Voice Notification: Locate speakers for voice notification to provide the intelligibility requirements of the "Notification Appliances" and "Emergency Communications Systems" chapters in NFPA 72.
 - 3. High-Range Units: Rated 2 to 15 W.
 - 4. Low-Range Units: Rated 1 to 2 W.
 - 5. Matching Transformers: Tap range matched to acoustical environment of speaker location.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.
 - 1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.
- B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
 - 1. Devices placed in service before all other trades have completed cleanup shall be replaced.

- 2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.
- B. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.
 - 1. Connect new equipment to existing control panel in existing part of the building.
 - 2. Connect new equipment to existing monitoring equipment at the supervising station.
 - 3. Expand, modify, and supplement existing control and monitoring equipment as necessary to extend existing control and monitoring functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.

3.03 PATHWAYS

- A. Pathways above recessed ceilings and in non-accessible locations may be routed exposed.
 - 1. Exposed pathways located less than 96 inches (2440 mm) above the floor shall be installed in EMT.
- B. Pathways shall be installed in EMT.
- C. Exposed EMT shall be painted red enamel.

3.04 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- B. Install framed instructions in a location visible from fire-alarm control unit.

3.05 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
- B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.06 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by authorities having jurisdiction.

- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
- D. Perform the following tests and inspections with the assistance of a factoryauthorized service representative:
 - 1. Visual Inspection: Conduct visual inspection prior to testing.
 - a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
 - 2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable soundlevel meter complying with Type 2 requirements in ANSI S1.4.
 - 4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
 - 5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
 - 6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
- E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- F. ire-alarm system will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports.
- H. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
- I. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.07 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 1. Include visual inspections according to the "Visual Inspection Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 2. Perform tests in the "Test Methods" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 3. Perform tests per the "Testing Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

3.08 SOFTWARE SERVICE AGREEMENT

- A. Comply with UL 864.
- B. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
- C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
 - 1. Upgrade Notice: At least **30** days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

3.09 **DEMONSTRATION**

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION 28 31 11

SECTION 31 10 00 SITE CLEARING

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

- 1. Provisions set forth in Divisions 0 and 1.
- 2. Clear site of plant life and grass.
- 3. Remove root system of trees and shrubs.
- 4. Remove surface debris.
- 5. Reuse or recycling.
- 6. Clean up.

B. Related Sections:

- 1. Section 02 41 13 Selective Site Demolition
- 2. Section 31 22 00 Earthwork
- 3. Section 31 31 19 Vegetation Control

1.02 SUBMITTALS

- A. Record Drawings:
 - 1. Keep a record of the location and size of all capped pipe and /or conduit.
 - 2. Submit record drawings per Section 01 70 00 "Execution and Closeout Requirements" for record drawing submittal.

1.03 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Work shall comply with applicable provisions of local and State safety and health ordinances.
 - a. Burning of removed materials is not permitted within the project limits.
 - 2. Take out and maintain required permits, approval and licenses necessary to legally complete this Work.
 - 3. Ensure that subcontractors are properly licensed and have the required permits to perform their work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Provide materials, not specifically described, but required for proper completion of the work of this Section, as selected by the Contractor.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which the work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work.
 - 1. Do not proceed until unsatisfactory conditions are corrected.
- B. Accept the premises in the condition as found on the first day of work under this Contract.

3.02 PREPARATION

- A. Notify utility companies concerning cut-off or restoration of service, or of relocation or modification of any such service that the work of this contract may require.
 - 1. Where utility cuffing, capping, or plugging is required, perform such work in accordance with requirements of the utility company or governmental agency having jurisdiction.
- B. Utilities:
 - 1. Protect and maintain in operation utility, irrigation, or sewer lines that are required to remain operative during the period of this contract.
 - a. If service is interrupted because of Work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.
 - b. If active utility lines are encountered and are not shown in the Drawings or otherwise made known to the Contractor/Construction Manager, promptly take necessary steps to assure that service is not interrupted.
 - c. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Architect and secure his instructions.
 - 1) Do not proceed with permanent relocation of utilities until written instructions are received from the Architect.

3.03 PROTECTION OR ADJUSTMENTS

- A. Enclose area of work with fence barricades.
 - 1. Protect trees and shrubs, where indicated to remain, by providing an additional fence around the tree or shrub so trees and shrubs will not be damaged in any way as part of the Work.
- B. The work area shall be kept securely always locked work is in progress.

- C. Post signs and warnings devices are necessary to exclude all persons, except those directly connected with the work from work areas.
 - 1. Barricade open depressions and holes occurring as part of this Work, and post warning lights on property adjacent to or with public access.
 - a. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
- D. Always maintain access to the project site.
- E. Protect adjacent buildings, shrubs, trees, and lawns from damage.
 - 1. Protect structures, utilities, sidewalks, pavements, water wells, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by operations under this Section.
- F. Do not interfere with use of adjacent buildings or safe ingress or egress.
- G. Use of explosives will not be permitted.

3.04 CLEARING

- A. Remove from Site:
 - 1. Vegetation, including roots of plants not shown, to remain.
 - a. Roots under and/or within five feet of proposed structures shall be completely removed to a minimum depth of two (2) feet below the bottom of the lowest proposed structural footing or two (2) feet below existing grade, whichever is lower.
 - 1) Roots deeper than the elevation indicated above, shall be excavated to allow no roots larger than one and one-half (1-1/2) inches in diameter.
 - 2) Surface vegetation shall not be used as engineered fill or blended with and compacted.
 - b. Remove roots outside five feet of proposed structures and larger than 1-1/2 inch in diameter to a depth of at least 12 (12) inches below the existing ground surface.
 - Treat roots smaller than one and one-half (1-1/2) inch in diameter remaining in the soil with a weed killer as specified in Section 02282 – Vegetation Control.
 - 2. Rubbish and debris.
 - 3. Rocks larger than 1 1/2" in diameter not shown to remain.
 - 4. Remove vineyard vegetation, posts, wires, and irrigation lines designated for removal on Drawings.
 - a. All underground irrigation lines shall be unearthed and removed from site.
 - 1) Plug or cap lines at property lines.
 - a) Coordinate with Contractor/Construction Manager, when applicable, or Architect.

- 5. Reuse or recycling: Per T24, Part 11, CGBSC Section 5.408.3 100% of trees, stumps, rocks, and associated vegetation resulting primarily from land clearing shall be recycled or reused. For phased project, such material may be stockpiled on site unite until the storage site is developed.
 - a. Utilize a Waste Management Company that can provide verifiable documentation that waste was diverted from landfills.
 - b. Conform to Waste Management Plan Developed for this project. Refer to Section 01 74 00 "Construction Wast Management and Disposal" for details.

3.05 CONSERVATION OF TOPSOIL

- A. After the area has been cleared of vegetation, strip the existing topsoil to a depth necessary to provide at least 6-inch depth of topsoil in areas shown on the Drawings to receive turf or plants, and to fill planters, without contamination with sub-soils.
 - 1. Coordinate topsoil volume required with Contractor/Construction Manager, when applicable, or Architect. Remove excess topsoil from property and dispose of offsite in legal manner.
- B. Stockpile in an area clear of new construction.
 - 1. Maintain the stockpile in a manner which will not obstruct the natural flow of drainage.
 - 2. Maintain stockpile free from debris and trash.
- C. Keep the topsoil damp to prevent dust and drying out.

3.06 CLEANING OR REPAIR

- A. Debris resulting from the work of this Section shall be removed and hauled away from the site.
 - 1. Debris and rubbish shall not be allowed to accumulate on the site.
- B. All material generated by this work shall be disposed of properly outside the project limits, in accordance with all applicable regulations, laws, and ordinances.
 1. Sprinkle loose material while being stored, handled, or loaded.
- C. Burning of removed materials is not permitted within the project limits.

3.07 CONDITION OF FINISHED WORK

- A. Protections, tools, materials, plant apparatus, and rubbish or debris shall be removed.
- B. Existing areas to remain, public or private property, that may have been damaged, made dirty, or otherwise disorderly because of this work shall be restored to good order.

EARTHWORK SECTION 31 22 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1;
 - 2. Earth moving;
 - 3. Application of water as required for compaction or dust control;
 - 4. Importing or removal of soil as required to complete the work;
 - 5. Preparation of sub-grade below walks and paving;
 - 6. Dust control during earthwork operations;
 - 7. Clean up.

1.02 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Work shall be performed in strict compliance with laws, ordinances, or regulations that govern this work.
- B. Project Record Documents:
 - 1. Any deviations from the work shown on the contract documents shall be clearly indicated on the project record documents.
 - 2. Deviations must receive approval by the Architect and DSA.
- C. Preliminary Geotechnical Investigation Report:
 - 1. The General Recommendations listed in the "Preliminary Geotechnical Investigation Report", dated 11-21-2023 as prepared by Soils Engineering, Inc. have been incorporated in this Section and shall be followed.
 - 2. Where conflicts occur between the drawings, specifications, and/or the Geotechnical Report, the most stringent requirement shall govern.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Earth:
 - 1. Filling and back-filling earth shall be clean and essentially granular with sufficient silt and clay binders.

- B. Imported Fill:
 - If it becomes necessary to import materials from offsite to complete the site grading, import soils shall consist of essentially granular, silty sands with low expansion potential and free of grasses, weeds, debris, rocks larger than 4" in maximum dimension and soluble sulfates in excess of 200 parts per million. Import fill shall contain sufficient silt and clay binders to render them stable in footing trenches and capable of maintaining specified elevation tolerances during paving operations.
 - 2. Any earthen materials proposed to be brought onto the school sites are subject to testing to verify they comply with Dept. of Toxic Substance Control (DTSC) standards. Owner shall determine if testing of materials is required prior to any materials being brought onto the site. Testing of materials may take up to two weeks to verify compliance with DTSC standards.
 - 3. Imported fill material shall be approved by the Soils Engineer and meet the requirements stated in the Geotechnical Report.
 - 4. Contact the Soils Engineer a minimum of 48 hours prior to the placement of fill materials to allow for proper review of the bottom of excavations.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Contractor shall thoroughly examine the project site prior to submitting his bid to familiarize himself with the conditions of the site and the conditions in which he will be required to work.
- B. Contractor shall thoroughly examine contract documents prior to bid.
 - 1. Documents do not necessarily indicate a balanced site.
- C. Contractor shall familiarize himself with the locations of utilities found onsite and shall protect utilities not shown to be removed.
 - 1. Coordinate excavations near existing utilities with utility companies.

3.02 INSTALLATION

- A. Excavations:
 - 1. Structural Over-Excavation:
 - a. Excavate to a minimum depth of four(4) feet below existing grade or provide at least twelve (12) inches of engineered fill beneath all footings and throughout the entire building, whichever is greater.
 - 1) Extend over-excavation a minimum of five (5) feet beyond the extent of exterior structural footings.
 - a) Exterior structural footings include footings for all covered walkway structures, unless noted otherwise.
 - b. Comply with noted requirements shown on drawings.

- c. Over-excavation is not required below the bottom of five (5) foot minimum deep round pier footings.
- d. Over-excavation below concrete block yard wall footings may be reduced to a depth of two feet below bottom of footing.
- e. Roots unearthed during excavation work shall be completely removed to a minimum depth of two (2) feet below the bottom of the lowest proposed structural footing or two (2) feet below finished subgrade, whichever is lower.

1) Roots deeper than the elevation indicated above shall be excavated to allow no roots larger than one and one-half (1-1/2) inches in diameter.

- f. Contractor shall notify Construction Manager/Architect/Project Inspector for proper inspection/review of the bottom of the excavations that can occur prior to continuing work.
- 2. Excavations for Concrete Footings:
 - a. Trench and excavation bottoms shall be smooth and uniform.
 - b. Do not excavate below required bottom of footing elevations.
 - 1) If over-excavated areas occur, they shall not be backfilled with earth materials.
 - 2) Fill with concrete to match footing at contractor's expense.
 - c. Keep excavations free of standing water.
- B. Fill
 - 1. Preparation for Fill:
 - a. Blade area to achieve a smooth uniform appearance.
 - b. Scarify to a depth of 8".
 - c. Moisten to near optimum moisture content.
 - d. Compact to required compaction to a depth of 8".
 - 2. Placing and Compacting Fill:
 - a. Place fill material in even layers which do not exceed 6" thickness after compaction.
 - b. Compact to required compaction.
 - 1) Not less than 90% of maximum dry density per ASTM D1557.
 - 2) Rework layers not complying with minimum density requirements until compliance is achieved.
 - c. Fill to within 0.1 feet of indicated finished grades.
 - d. Surface of fill to be smooth and uniform.
 - 3. Placing Fill on a Slope:
 - a. For sub-grades steeper than 10 to 1, place fill in flat bench layers.
 - 1) Benches shall be min. 10'-0" in width.
- C. Sub-Grade Preparation:
 - 1. Prepare areas as if for fill.
 - 2. Leave smooth, uniform surface.

- D. Back-Filling:
 - 1. After completion and inspection of concrete footings, fill voids between footings and earth banks with clean soil.
 - a. Place in layers that do not exceed 6" in thickness after compaction.
 - b. Compact to required compaction as specified for placing and compacting fill.
 - c. Fill to within 0.1 feet of indicated finished grades.
 - d. Surface to be smooth and uniform.
 - 2. No jetting or ponding will be allowed, unless approved by the Structural Engineer of Record.
- E. Finish Grading:
 - 1. After cutting, filling, and back-filling are complete, finish grade site to within 0.1 feet of indicated grades, except as noted below.
 - a. Planters at grade: 1-1/2" below adjacent walk.
 - b. Above-grade planters: 4" below top of planter, unless noted otherwise.
 - c. Lawn or turf areas: 1 /2" below adjacent walks.
 - d. Grade a sufficient distance behind curbs to allow for placement of forms.
- F. Dust Control:
 - 1. During all phases of the earthwork, water material and site to reduce dust.
- G. Noise Control:
 - 1. Use reasonable measures to control noise.
- H. Cleanup:
 - 1. Rake clean.
 - 2. Remove unsuitable materials, excess materials, and debris, and dispose of offsite in a legal manner.
 - 3. Adjacent roadways shall be kept clean during the progress of this work.
 - 4. Upon completion of this work, water spray clean adjacent roadways.

3.03 PROTECTION

- A. Contractor shall protect all adjacent properties from damage resulting from the work of this Section.
- B. Contractor shall protect the work of other trades from damage resulting from the work of this Section.
 - 1. Layout or survey markers shall be carefully maintained.
 - a. Damaged markers must be replaced at the contractor's expense.

- C. Provide and maintain proper barricades or barriers to ensure the safety of workers and the public.
 - 1. Provide dusk-to-dawn warning lights at hazards adjacent to public access.
 - 2. Protect existing concrete walks, curbs, and other permanent structures that are to remain.
 - a. Repair or replace damaged items to the satisfaction of the Architect.
- D. Contractors shall take precautions to avoid loss of soil or debris during transit.
- E. Underground Utilities:
 - Maintain all underground utilities, unless noted otherwise.
 a. Comply with utility company requirements.
 - 2. Notify Owner and utility company of any utilities to be cut off, modified, or relocated.
 - a. Comply with utility company requirements.
- F. Take necessary precautions to guard against water accumulation in trenches, under buildings, or on adjacent property during the course of this work.
- G. Take necessary precautions to guard against erosion of the project site or adjacent property during the course of this work.

3.04 QUALITY CONTROL

- A. Tolerances:
 - 1. Variation from indicated grades may not exceed 1/10 of a foot.
- B. Certification of Grades:
 - 1. Contractor shall hire a California state licensed civil engineer or surveyor to certify that the grades established during the earthwork comply with the requirements of the contract documents.
 - 2. Contractor shall deliver to Owner a 1"=30'-0" scale as-graded reproducible Mylar plan.
 - a. Plan shall be produced in a professional manner.
 - b. Plan shall show as-graded elevations.
 - c. Plan shall be stamped and signed by the civil engineer or land surveyor hired by the Contractor to certify the grading.
 - 3. The Owner reserves the right, at their own discretion, to hire an independent civil engineer to perform a survey of the project site to confirm the accuracy of the grading work.
- C. Field Testing:
 - 1. Field density testing shall be performed as directed by the Soils Engineer.

END OF SECTION 31 22 00

TERMITE CONTROL SECTION 31 31 16

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1
 - 2. Pre-construction termite control
 - 3. Clean-up.
- B. Related Sections:
 - 1. Section 03 31 00 Structural Concrete Work
- C. Performance Requirements:
 - 1. Provide a toxic barrier under and around building areas to prevent termite entry.

1.02 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product or Material Data:
 - 1. Submit copies of material data sheets to the Architect for review prior to application.

1.03 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Comply with regulations governing the storage and application of these materials.
 - 2. Conform to State of California requirements for licensure and authority to use toxicant chemicals.
- B. Qualifications:
 - 1. Application shall be performed by an applicator approved by the chemical manufacturer.

1.04 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Apply materials only under environmental conditions within the manufacturer's range of recommended conditions.

1.05 WARRANTY

- A. Warranty:
 - 1. Furnish to Owner a written five (5) year guarantee against subterranean termites.
 - 2. Areas of infestation appearing within the five (5) year period shall be retreated at no additional expense.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Use one of the following materials in working solution in strict conformance with governmental regulations:
 - 1. Premise, Pre-Construction Insecticide (Bayer)
 - 2. Dominion 2L
 - 3. Or approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine the area upon which work is to be performed.
- B. Correct detrimental conditions prior to application.

3.02 DELIVERY, STORAGE AND HANDLING

A. Store materials in strict conformance with the manufacturer's written recommendations and government regulations.

3.03 INSTALLATION OR APPLICATION

- A. Apply in accordance with the manufacturer's recommendation.
- B. Apply under all building pads, footings, and areas within 2'-0" of buildings.
- C. Apply to substrate immediately prior to the installation of the membrane vapor barrier to avoid losses due to evaporation.
 - 1. When substrate is crushed rock fill applied below membrane vapor barrier, apply additional treatment to soil prior to installation of fill.
- D. Footing trenches shall be treated not more than 24 hours prior to concrete pour.
- E. Treat critical locations, such as utility footing penetrations and expansion joints with linear treatment at the manufacturer's recommended rate.
 - 1. Treat inside of utility trenches for a minimum of 48" beyond the building pad.

F. Retreat soil that is disturbed after original treatment.

3.04 PROTECTION OR ADJUSTMENTS

A. Take precautions to protect adjoining property and areas designated for planting.

END OF SECTION 31 31 16

VEGETATION CONTROL SECTION 31 31 19

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Pre-construction vegetation control.
 - 3. Submittal preparation.
 - 4. Clean up.
- B. Related Sections:
 - 1. Section 32 12 16 Asphaltic Concrete Paving
 - 2. Section 32 13 13 Site Concrete

1.02 SUBMITALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product or Material Data:
 - 1. Submit copies of material data sheets to the Architect for review prior to application.
 - 2. Submittal shall include the manufacturers data sheets showing the appropriate application rate for the proposed use.

1.03 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Comply with regulations governing the storage and application of these materials.
 - 2. Conform to State of California requirements for licensure and authority to use toxicant chemicals.
- B. Qualifications:
 - 1. Application shall be performed by an applicator approved by the chemical manufacturer.
- C. Performance Requirements:
 - 1. Sterilization shall prevent seed germination and plant growth, under paving, sidewalks, curbs, gutters, and other areas indicated on the drawings.

1.04 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Apply materials only under environmental conditions within the manufacturer's range of recommended conditions.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Use one of the following materials in working solution in strict conformance with governmental regulations:
 - 1. Under paving, sidewalks, curbs, gutters:
 - a. Treflan (Trifluralin)
 - b. Pramitol 25E (prometon)
 - c. Or approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine the area upon which work is to be performed.1. Correct detrimental conditions prior to application.

3.02 DELIVERY, STORAGE AND HANDLING

A. Store materials in strict conformance with the manufacturer's written recommendations and government regulations.

3.03 INSTALLATION OR APPLICATION

- A. Apply in accordance with the manufacturer's recommendation.
- B. Apply to area receiving paving, sidewalks, curbs, and gutters immediately prior to installation.
- C. Apply herbicide material to bottom of apparatus yards, jump pits, and sand areas immediately prior to installation of protective surfacing.

3.04 PROTECTION OR ADJUSTMENTS

A. Take precautions to protect adjoining property and areas designated for planting.

END OF SECTION 31 31 19

ASPHALTIC CONCRETE PAVING SECTION 32 12 16

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1;
 - 2. Layout of work;
 - 3. Preparation of finish subgrade to receive asphaltic concrete paving;
 - 4. Necessary accessories;
 - 5. Aggregate base;
 - 6. Asphaltic concrete paving;
 - 7. Sealing of asphaltic concrete paving;
 - 8. Submittal preparation;
 - 9. Clean up.

B. Related Sections:

- 1. Section 31 20 00 Earthwork
- Vegetation Control
- Section 31 31 19
 Section 32 17 00 Paving Accessories and Striping

1.02 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO)
 - 1. AASHTO Standard M208 Standard Specification for Cationic Emulsified Asphalt.
- B. ASTM International (ASTM)
 - 1. ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft³).
 - 2. ASTM D2397 Standard Specification of r Cationic Emulsified Asphalt.
- C. California State Transportation Agency (CalTrans)
 - 1. Standard Specification, Division 26 Aggregate Bases.
 - 2. Standard Specification, Division 39 Asphalt Concrete.

1.03 SUBMITTALLS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures,
- B. Product or Material Data:
 - 1. Submit copies of material product data and asphaltic concrete mix design for review by the Architect prior to beginning work.

1.04 QUALITY ASSURANCE

A. Qualifications:

- 1. Asphalt mixing plant shall conform to the standards set by the State of California Department of Transportation.
- 2. Work shall be performed in conformance with the Standard Specifications of the State of California Department of Transportation.

1.05 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Do not apply tack and/or prime coats over wet surfaces.
 - 2. Installation of asphaltic concrete shall not take place when the temperature is below 50 degrees F.

1.06 WARRANTY

- A. Warranty:
 - 1. Contractor shall repair any portions of asphaltic paving that exhibit signs of creeping, cracking, shoving, raveling, softening, or other defects within one year of the acceptance of the project.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Soil sterilant shall be per Section 31 31 19 "Vegetation Control".
- B. Aggregate base shall comply with CalTrans Standard Specifications, Section 26 for Class II base.
- C. Tack coat shall be emulsified asphalt conforming to AASHTO M208 ASTM D2397 CSS-1 or CSS-1h.
- D. Dilute one-part water to one-part emulsified asphalt.
- E. Asphaltic concrete shall be hot-mix type B asphaltic concrete, uniformly graded aggregate to 1/2" maximum, medium grading, per State of California CalTrans Standard Specifications, Section 39, using PG 64-10 profile-graded asphalt. No Recycled Asphalt Pavement (RAP) will be allowed in aggregate.

F. Fog Seal:

- 1. Emulsified asphalt conforming to AASHTO M208 ASTM D2397 CSS-1 or CSS-1h.
- G. Redwood Headers:
 - 1. 3x6 foundation grade redwood.

- H. Joint Sealant:
 - 1. Use Novalink SL Self-leveling Joint Sealant.
 - 2. Or approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Commencement of work indicates acceptance of surface conditions.
- B. Verify subgrade compaction prior to placing Aggregate Base.

3.02 SEQUENCE AND SCHEDULING

 A. For projects involving a construction manager, the contractor shall plan on at least 2 mobilizations to site project areas. The locations and scheduling shall be as determined by the construction manager at a later date.

3.03 INSTALLATION OR APPLICATION

- A. Installation shall be performed in conformance with CalTrans Standard Specifications, unless noted otherwise.
- B. Edges of paving not confined by concrete structures shall be confined using header boards.
- C. Compact subgrade to required compaction indicated in Section 31 22 00. "Earthwork", and as shown on construction plans.
- D. Aggregate base shall be placed over compacted subgrade and compacted to 95% of the maximum density per ASTM D-1557 per Section 26 of the CalTrans Standard Specifications.
- E. Apply soil sterilant on the compacted aggregate base per the manufacturer's recommendations immediately prior to paving.
- F. Apply tack coat to vertical surfaces joining new AC paving at a rate of 0.10 gallon per square yard. Do not place tack coat on surfaces to remain exposed.
 1. Allow sufficient time for proper curing of tack coat prior to installing AC paving.
- G. Install AC paving in number of layers required in Section 39-6 of the CalTrans Standard Specifications.
- H. Spread AC paving and perform first coverage of initial or breakdown compaction when paving mixture is not less than 250 degrees F. All breakdown compaction shall be completed before the temperature of the mixture drops below 200 degrees F.

- I. Construct AC paving to required thickness and provide flush transitions to adjacent headers, walks, etc. Where paving will drain onto adjacent concrete surfaces, paving shall be set 1/8" to 1/4" higher than concrete surface (i.e. gutters).
- J. Per CalTrans Section 39-6: "Segregation of aggregate shall be avoided, and the surfacing shall be free from pockets of course or fine material. Asphalt concrete or asphalt concrete base containing hardened lumps shall not be used." Saw cut, remove, and replace areas of asphalt paving with visible segregated aggregate.
- K. Roll paving to obtain maximum compaction.
- L. Inspect surface and repair surface prior to final rolling.
 - 1. Fill voids in surface.
 - 2. Remove roller marks.
- M. Install fog seal per manufacturer's recommendations.

3.04 INSTALLATION OR APPLICATION

- A. Do not permit vehicular traffic on paving until it has cooled and hardened.
 - 1. Provide barricades as required.
- B. Once accessories, site signage, or athletic and playfield equipment have been installed, patch joint between concrete and AC paving, as well as over-cutting of paving with specified joint sealant.
- C. Protect existing property and the work of other trades.

3.05 INSTALLATION OR APPLICATION

A. Tolerances:

- 1. Completed asphalt base course shall not vary in thickness more than 1/4" from design thickness.
- 2. Completed asphalt surface course shall not vary in thickness more than 1/4" from design thickness.
- 3. Completed asphalt base course surface plane elevation shall not deviate more than 1/4" when measured in relation to a 10'-0" straightedge laid in any direction.
- 4. Completed asphalt surface course plane elevation shall not deviate more than 1/4" when measured in relation to a 10'-0" straightedge laid in any direction. Surface elevation shall not deviate more than 1/4" from design elevations.
- 5. Flood test finished paved surfaces in the presence of the architect.
- 6. Areas of residual ponding water exceeding 1/4" in depth shall be corrected to the satisfaction of the Architect.

END OF SECTION 32 12 16

SITE CONCRETE PAVING SECTION 32 13 13

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1
 - 2. Concrete flatwork other than buildings and structures
 - a. Including concrete walks, drive approaches, curbs, gutters, ramps, steps, risers, mow strips, etc.
 - 3. Concrete recesses pits for truncated dome tilework
 - 4. Concrete finishing and special surfacing of site concrete
 - 5. Curing, protection, and patching of site concrete+
 - 6. Vegetation control
 - 7. Expansion and tool joints in site concrete
 - 8. Caulking of expansion joints in site concrete
 - 9. Sealing of exposed aggregate finish site concrete
 - 10. Trench drains and grate covers
 - 11. Accessories and associated hardware
 - 12. Installation of cast-in-place truncated dome tiles
 - 13. Forming and shoring for site concrete
 - 14. Placing of sleeves, inserts, and embedded items in site concrete
 - 15. Installation of embedded stair nosings warning strips
 - 16. Clean sand fill under concrete flatwork or slabs as required for leveling and/or final grading of base
 - 17. Stamped and Colored Concrete
 - 18. Submittal preparation
 - 19. Clean up.

B. Related Sections:

- 1. Section 03 21 00 Reinforcing Steel
- 2. Section 03 31 00 Structural Concrete Work
- 3. Section 10 14 16 Site Signage
- 4. Division 23 00 00 Mechanical
- 5. Division 26 00 00 Electrical
- 6. Section 31 00 00 Earthwork
- 7. Section 31 31 19 Vegetation Control
- 8. Section 32 12 16 Asphaltic Concrete Paving
- 9. Section 32 17 26 Tactile Warning Surfacing
- 10. Section 32 31 13 Chain Link fences and gates
1.02 REFERENCES

- A. ACI 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International.
- B. ACI 302.1R Guide for Concrete Floor and Slab Construction; American Concrete Institute International.
- C. ACI 304R Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International.
- D. ACI 305R Hot Weather Concreting; American Concrete Institute International.
- E. ACI 306R Cold Weather Concreting; American Concrete Institute International.
- F. ACI 308R Guide to Curing Concrete; American Concrete Institute International.
- G. ASTM C 33 Standard Specification for Concrete Aggregates.
- H. ASTM C 39/C 39M Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- I. ASTM C 94/C 94M Standard Specification for Ready-Mixed Concrete.
- J. ASTM C 143/C 143M Standard Test Method for Slump of Hydraulic-Cement Concrete.
- K. ASTM C 150 Standard Specification for Portland Cement.
- L. ASTM C 173/C 173M Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
- M. ASTM C 260 Standard Specification for Air-Entraining Admixtures for Concrete.
- N. ASTM C 618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- O. ASTM C 685/C 685M Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.
- P. ASTM C 1059 Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.
- Q. ASTM E 1155 Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product or Material Data:
 - 1. Submit copies of the concrete mix design to the Architect for review prior to installing materials.
 - 2. Submit copies of the product data to the Architect for review prior to installing the following:
 - 3. Expansion joints.
 - 4. Joint caulking material.
 - 5. Samples or Mockups:
 - a. Provide a minimum 48" square mock-up of concrete finishes to jobsite for approval of finishes prior to pouring exposed portions of work.
 - b. Mock-up may be incorporated into the project.
- C. Shop Drawings or Layout Drawings:
 - 1. Submit copies of shop drawings to the Architect for review prior to beginning fabrication.

1.04 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Walks and sidewalks shall have a continuous common surface, not interrupted by steps or by abrupt changes in level exceeding 1/2 inch and shall be a minimum of 48 inches in width. Surfaces shall be slip-resistant as follows:
 - a. Slopes less than 5 percent:3
 - 1) Surfaces with a slope of less than 5% gradient shall be at least as slip resistant as that described as a medium broom finish per 2022 CBC Sections 11B-302 and 11B-403.3.
 - b. Slopes 5% percent or greater:
 - 1) Surfaces with a slope of 5 percent or greater gradient shall be at least as slip resistant as that described as a heavy broom finish per 2022 CBC Sections 11B-302 and 11B-403.3.
 - 2) Aluminum Oxide Aggregate surface-applied finish.
 - c. Cross slopes:
 - 1) Surface slopes shall not exceed 1:48 per 2022 CBC Section 11B-403.3.
- B. Testing:
 - 1. Prior to preparation of finish sub-grade for work of this Section, the Contractor shall give appropriate notification to the inspector and allow adequate time for compaction tests to be taken when required by the inspector prior to work to sub-grade.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Portland Cement:
 - 1. Conform to ASTM C150, Type II or V, with the following exceptions:
 - 2. Cement shall not contain more than 0.60% total alkali when calculated as Sodium Oxide.
- B. Fly Ash:
 - 1. Conform to ASTM C618, Class F
 - a. Fly Ash may substitute cement for up to 30% of mix C+P content provided that the design mix meets 28-day strength requirements.
- C. Aggregates:
 - 1. Conform to ASTM C33.
 - 2. Fine aggregate shall consist of washed natural sand.
 - a. Fine aggregate shall not contain more than two percent (2%) by weight of deleterious substances.
 - b. Fine aggregate shall meet the requirements of Table 1 below.
 - 3. Coarse Aggregate shall consist of a clean, crushed rock or washed gravel.
 - a. Shall not contain more than five percent (5%) by weight of flat, thin, elongated, or laminated material.
 - b. Shall not contain more than two percent (2%) by weight shale or charty material.
 - c. Coarse aggregate shall be 3/4" maximum size, see requirements of Table 1 below.

 Table 1 - GRADING OF COMBINED AGGREGATES

- Sieve (Woven Wire Cloth): Passing a 1-1/2"
 a) Percent by Weight 3/4" Maximum
- 2) Sieve (Woven Wire Cloth): Passing a 1"
 - a) Percent by Weight 3/4" Maximum
- 3) Sieve (Woven Wire Cloth): Passing a 3/4"a) Percent by Weight 3/4" Maximum: 90-100
- 4) Sieve (Woven Wire Cloth): Passing a 3/8"
 - a) Percent by Weight 3/4" Maximum: 55-75
- 5) Sieve (Woven Wire Cloth): Passing a #4
 - a) Percent by Weight 3/4" Maximum: 40-60
- 6) Sieve (Woven Wire Cloth): Passing a #8a) Percent by Weight 3/4" Maximum: 30-46
- 7) Sieve (Woven Wire Cloth): Passing a #16
 - a) Percent by Weight 3/4" Maximum: 23-40
- 8) Sieve (Woven Wire Cloth): Passing a #30
 - a) Percent by Weight 3/4" Maximum: 13-28

- 9) Sieve (Woven Wire Cloth): Passing a #503
 - a) Percent by Weight 3/4" Maximum: 5-15
- 10)Sieve (Woven Wire Cloth): Passing a #100
 - a) Percent by Weight 3/4" Maximum: 0-5

Note: "Pea Gravel" mixes (mixes with 3/8" max. aggregate size), other than mixes used for exposed aggregate finish, will not be allowed.

D. Water shall be potable, clean and free from organic materials.

2.02 ACCESSORIES

- A. Concrete Expansion Joints:
 - 1. Expansion joints shall be formed with 3/8" x 3-1/2" expansion joint and 3/8" x 1/2" expansion joint cap.
 - a. Basis of Design:
 - 1) Sealtight by W. R. Meadows:
 - a) Fibre Expansion Joint.
 - b) Snap-Cap Expansion Joint Cap.
 - 2. Expansion joint sealant shall be self-leveling polyurethane sealant for horizontal expansion joints.
 - a. Conform to ASTM C 920, Type M, Grade P, Class 25, and Fed Spec. TT-S-00227E, Type I, Class A:
 - 1) W.R. Meadows, Sealtight Pourthane SL
 - 2) BASF Masterseal SL2
 - 3) Or equal.
- B. Clean sand fill under concrete flatwork or slabs shall conform to the fine aggregate specification above.
- C. Curing Compound shall white-pigmented.
 - 1. Conform to ASTM C309.
- D. Fiber Reinforced Concrete: Where called out on plans.
 - 1. Manufacturers/Product:
 - a. Master Builders microfilament fiber; MasterFiber M100.
 - b. Sika micro-synthetic monofilament fiber; Fibermesh-150
- E. Slip-Resistive Aggregate:
 - Factory-graded, packaged, rustproof, non-glazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery with emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide, unaffected by freezing, moisture, and cleaning materials.
 Pasis of Design: EMAC 20 by Lambert Corp.
 - a. Basis of Design: EMAC-20 by Lambert Corp.
- F. Pebble rock for exposed aggregate finish shall be 3/8" maximum river rock or crushed rock of a natural color blend.
 - 1. Color and texture shall be as selected by Architect.

- G. Sealer hardener shall be clear, non-yellowing, sealer-hardener.
 - 1. Install per manufacturer's recommendations.
 - a. BASF Kure-N-Harden water-based silicate sealer or equal.
- H. Waterstops shall be 4" serrated center bulb PVC.
 - 1. Basis of Design:
 - a. Greenstreak #702.
- I. Retarder shall be specifically designed to retard the hydration in cement only for a depth required to expose the aggregate.
 - 1. Basis of Design:
 - a. The Euclid Chemical Company-Formula S.
- J. Prefabricated Contrasting-Color Tread Nosing
 - 1. Cast-in-place extruded aluminum nosing with replaceable safety tread.
 - a. American Safety Tread Co., Inc. Type BF211D; Color black
 - b. Snap-in screw down nosing piece after clean-up and curing to maintain clean abrasive surface.
 - c. Or approved equal.
- K. Colored Stamped Concrete
 - 1. Stamps shall be "Random Ashlar Stone" #MB-112 as manufactured by Decorative Concrete Supply Co. or equal. Or as selected by Architect.
 - 2. Colorant shall be by Concrete Colors, Inc. or BrickForm, Inc.

PART 3 EXECUTION

3.01 EXAMINATION

A. Start of work shall be considered as acceptance of existing conditions.

3.02 DELIVERY, STORAGE, AND HANDLING

- A. A weighmasters certificate shall accompany each load of concrete.
 - 1. This certificate is to be delivered to the Project Inspector and Project Manager.
- B. Cement shall be stored in such a manner so as to protect it from damage.
- C. Only one (1) brand of cement shall be used for this work.

3.03 SEQUENCING AND SCHEDULING

A. Concrete shall be poured within 90 minutes of mixing.

3.04 VEGETATION CONTROL

A. Immediately prior to installing concrete, vegetation control chemicals shall be applied to the soil.

3.05 INSTALLATION OR APPLICATION

- A. Install per the manufacturer's latest written recommendations.
- B. Concrete shall conform to the recommendations of the Portland Cement Association and the American Concrete Institute, unless otherwise shown or noted in these specifications.
- C. Preparation and Compaction:
 - 1. Concrete flatwork or vehicle traffic areas shall be placed over rolled sub-grade.
 - a. Proof roll sub-grade and rework unsuitable areas prior to installing leveling sand fill.
 - b. Compact subgrade to 95% relative compaction in traffic areas.
 - c. Compact subgrade to 90% relative compaction in pedestrian walks and other slab areas.
- D. Forms:
 - 1. Forms shall be built true-to-line and grade.
 - 2. Forms shall be rigid enough to prevent excessive deflection between supports.
 - a. Supporting studs or joists shall not be spaced more than twelve inches on center.
 - 3. The site curbs and gutters shall conform to the CalTrans specifications. The surfaces are to be true and straight. The maximum tolerance for the top, edges or any face is 0.01' (1/8") from the edge of a ten foot straight-edge.
 - 4. The curved site curbs and gutters shall conform to the CalTrans specifications. The surfaces are to be true and uniform using flexable formboards. The maximum tolerance for the top, edges or any face is 0.01' (1/8") from the edge of a ten foot straight-edge.
 - 5. Arrangement and construction shall be subject to the approval of the Architect. a. Responsibility for the adequacy of the forms rests with the Contractor.
 - 6. Coordinate to properly receive other construction, accessories, and anchorage.
 - a. Install sleeves, inserts, bolts, conduit, or other devices prior to placing concrete.
 - b. Install waterstops at all vertical expansion joints and construction joints.
- E. Forms for Exposed Vertical Concrete:
 - 1. Exposed concrete shall be formed with Douglas Fir "Plyform" placed with the grain of the outer plies in the direction of their span.
 - a. The surfaces of the forms shall be smooth and free from irregularities.
 - b. Wall-form panels shall be placed with their long dimension horizontal.2. All exposed sharp corners shall be formed with 3/4" chamfers or fillets.

- F. Form ties or bolts shall be used to fasten the forms.
 - Use sufficient strength and number to prevent spreading of forms.
 a. Wire ties will not be permitted.
 - 2. Ties shall be of such type that they can be entirely removed or cut back one inch (1") or more from the finished concrete surface.
- G. Form Coating:
 - 1. Forms shall be coated with non-staining form oil.
 - a. Apply shortly before the concrete is placed, prior to placing the reinforcement.
- H. Form Removal:
 - 1. Form removal shall be performed in such a manner as to prevent damage to the concrete.
 - 2. Do not remove forms until the concrete has sufficiently hardened to permit their removal with safety.
 - a. Form removal will not be allowed in less time than as follows:

Type of Work	Minimum Time
Walls, Vertical Forms	24 hours
Slabs	24 hours
Note: Time is measured	from addition of a

Note: Time is measured from addition of cement to aggregate.

- I. Treads and Nosings:
 - 1. Provide 2" contrasting color (70% recommended) warning stripe of material at least as slip resistant as the other treads of the stairs, 1" max from edge of nosing and top landing. At interior stairs, provide warning stripe at top landing and bottom tread nosing only. At exterior stairs, provide warning stripe at top landing and all tread nosings, CBC Section 11B-504.4.1.
- J. Embedded Items:
 - 1. Cooperate with all trades to ensure that all conduit, anchor bolts, sleeves, inserts, hangers, trench drains, grates, etc., are properly installed and secured in the correct position.
 - a. Embedded items shall be thoroughly clean and free from rust, scale, oil, or other foreign matter.
 - b. All embedded items shall be securely held in their final positions by means of templates before concrete is poured.
 - c. All pipes and conduits penetrating slabs shall be sleeved with PVC pipe, sized 1/2" larger I.D. vs pipe O.D. (1/4" gap around) and topped with self-leveling sealant.
- K. Reinforcement:
 - 1. Concrete walks under roof areas shall be reinforced with #3 bars at 24" on center each way minimum, unless noted otherwise.
 - a. Provide #4 bar dowels at 24" O.C. into adjacent footings.2. Locate reinforcement at mid height of flatwork or slab.

- L. Mixing:
 - 1. Transit-Mixed Concrete:
 - a. Mix and deliver in accordance with the requirements of ASTM C-94.
 - b. Weighmasters Certificate shall accommodate each load of concrete.
 - c. Water/(cement+fly ash) ratio shall be 0.50 or less.
 - 2. Slump:
 - a. The amount of mixing water used shall not cause the slump to exceed the maximum allowed slump of 4 1/2".
 - b. Slump test shall conform to ASTM C-143.
- M. Placing:
 - Concrete shall be used while fresh and before it has taken an initial set. a. Retempering partially hardened concrete will not be permitted.
 - 2. Place concrete in horizontal layers of such thickness that can be satisfactorily consolidated with vibrators.
 - 3. Place concrete as close as possible to its final position.
 - a. Use of vibrators for extensive shifting shall not be permitted.
 - 4. Fresh concrete shall not be permitted to fall more than six feet (6'-0").
 - 5. Maximum spacing of deep-tooled joints for site work shall be as follows:
 - a. 5 feet on center for sidewalks.
 - b. 20 feet on center for curbs and gutters
 - c. 10 feet on center for mow strips.
 - d. Mow strips for chain link fencing shall have deep tool joints at each post.
 - 6. Deep tool joints shall be a minimum of 1 1/8" deep with 3/8" radii edging.
 - 7. Tool edges of flatwork or slabs at construction joints and other exposed corners.
 - 8. Tool and expansion joints shall be located where shown on plans. Align joints of curbs or curbs and gutters with adjacent sidewalks.
 - a. Tool joints shall be uniform, straight, made perpendicular to building face, and parallel to each other for a uniform and consistent look.
 - 9. Expansion joints shall be placed at a maximum of 20 feet on center for sidewalks, curbs, and curbs and gutters.
 - a. Place expansion joints to align with the corners of buildings or structures and to align with the center of structural columns.
 - 10. Planter or retaining walls shall have chamfer joints or tool joints to control cracking.
 - a. Chamfer joints shall be placed at a maximum of 20 feet on center. Place waterstop at chamfer joints of planters.
 - b. Tool joints shall be as indicated on drawings. When not indicated, place tool joints a maximum of 10 feet on center.
 - c. Joints shall be continuous across tops and down backs.

- N. Cold Weather Requirements:
 - 1. Do not place concrete on frozen ground.
 - 2. Do not mix or place when atmospheric temperature is below 35 degrees F.
 - 3. Protect concrete from freezing or frost for a period of five (5) days after placing.
 - 4. Calcium Chloride shall not be added to the mix.
- O. Curing:
 - 1. Keep newly placed concrete moist for the first seven (7) days after the concrete has been placed, or;
 - 2. Horizontal Surfaces:
 - a. Slabs poured in hot or dry weather shall have a fog spray applied to them during troweling.
 - b. Slabs shall be cured with curing compound.
 - 1) Spray-applied curing compound having white pigment.
 - a) Conform to ASTM C-309.
 - b) Fully coat surface to a solid white color.
 - 3. Vertical Surfaces:
 - a. If forms are removed prior to end of curing period, vertical surfaces shall be cured by one of the following methods:
 - 1) Plastic film with joints sealed or taped
 - a) The perimeter of the film shall be sprinkled once daily.
 - b) Install as soon as form work is removed.
 - 2) Curing Compound
 - a) Spray-applied curing compound having white pigment.
 - i) Conform to ASTM C-309.
 - ii) Fully coat surface to a solid white color.
- P. Slip-Resistive Aluminum Oxide Aggregate Finish:
 - 1. Before final floating, apply slip-resistive aggregate where indicated and to concrete ramps, landings, and stair treads.
 - a. Slip-Resistive Aluminum Oxide Granules Finish:
 - 1) As soon as surface water has disappeared, make one pass with the steel trowel and broadcast aluminum oxide onto the surface of concrete ramps, landings, and stair treads where indicated.
 - a) Uniformly spread 1/4 pound of slip-resistive granules per square foot of surface (25#/100 sq.ft.). Lightly tamp aggregate flush with surface using a steel trowel, do not force below surface. After broadcasting and tamping, apply light float finish.
 - b) After curing, wash surface with a 10% solution of muriatic acid and flush with fresh water to expose slip-resistive aggregate.

- Q. Exposed Aggregate Finish:
 - 1. Where indicated on plans.
 - 2. Finish shall be uniform throughout the site. Maintain consistency in retarder application rate, length of time of set, and water blast pressure throughout the site.
 - 3. Submit a pea gravel mix for approval prior to application.
 - 4. Pebble Rock shall project a maximum of 1/8" above concrete surface.
 - 5. Install concrete as per standard finished concrete.
 - 6. After troweling, apply surface retarder per manufacturer recommendations.
 - 7. Water wash retarder after concrete set per manufacturer recommendations.
 - 8. Moisture cure concrete as listed above.
 - 9. 72 hours minimum after the concrete has been completed; clean the surface with a 5% solution of muriatic acid to remove any residual cement glazing from aggregate surfaces.
 - 10. Aggregate rock finish areas shall receive concrete sealer/hardener.
 - a. Cure concrete per manufacturer recommendations prior to sealer application.
 - b. Clean flatwork or slab prior to sealer application.
- R. Colored Stamped Concrete:
 - 1. Where indicated on the plans.
 - 2. Finish and color shall be uniform throughout the project area.
 - 3. Install concrete per standard finished concrete then apply colorant as follows:
 - a. Dry Shake Color Hardener:
 - 1) Spread at a rate not less than the manufacturers recommendation between 90-110 pounds per 100 sq.ft. depending on color selected.
 - 2) Immediately following initial floating operations, uniformly distribute approximately 2/3 of the required colorant material over the concrete surface and embed by means of bull floating. Follow floating operation with second shake application, uniformly distribute the remainder of the material at a right-angle application to the first and embed by bull float.
 - 3) After completion of broadcasting and floating- apply trowel finish.
 - b. While concrete is still in its plastic state, apply the tool texture pattern to the surface of the concrete using a sprinkle of a dark brown or grey as a releasing agent or other approved bond breaker to keep tools from sticking to the surface of the concrete. Properly tamp the texture pattern to the surface of the concrete. Apply with uniformity of pattern and depth of stamping.
 - c. The stamping depth and surface characteristics shall meet C.B.C. surface regulations per Section 11B-302 and 11B-303.
 - d. Only pour as much concrete that can be easily worked to maintain uniform results.
 - e. Colored and stamped concrete shall be sealed with two coats of BASF Kure-N-Seal water based acrylic sealer applied per manufacturers recommendations.

3.06 QUALITY CONTROL

- A. Tolerances:
 - 1. Concrete flatwork shall be true-to-plane to within 1/4" in 10'-0".
- B. Field Testing:
 - 1. Any concrete in question to its quality may be tested at the discretion of the Architect, Inspector, or Owner. The Inspector may take concrete test cylinders from each batch of concrete.

3.07 PROTECTION OR ADJUSTMENTS

- A. Defective Concrete:
 - 1. Concrete will be considered defective for the following reasons:
 - a. Not meeting the minimum strength requirement.
 - b. Not formed as indicated.
 - c. Not true to intended alignment.
 - d. Containing voids or rock pockets.
 - e. Surface deviation of greater than specified tolerance.
 - f. Concrete damaged due to erection operations.
 - g. Concrete that does not fully conform to the specifications.
 - h. Inconsistent surface finishes.
 - 2. Defective concrete shall be removed and replaced with concrete complying with the drawings and specifications.
 - a. Unless otherwise approved by the Architect.

3.08 SCHEDULES

- A. Typical Concrete Finish Schedule
 - 1. Type of Finish: slip-resistive aggregate finish
 - a. Type of Surface: concrete ramps, landings, and stair treads
 - 2. Type of Finish: exposed aggregate finish a. Type of Surface: where indicated
 - 3. Type of Finish: heavy broom finish a. Type of Surface: concrete slopes exceeding 5%
 - 4. Type of Finish: medium broom finish
 - a. Type of Surface: all other areas
- B. Concrete Test-Strength Schedule
 - 1. Type: un-reinforced, reinforced and exposed aggregate finished concrete a. Required Strength: 3000 psi

 - b. Minimum 7 Day Test: 1800 psi
 - c. Minimum 28 Day Test: 3000 psi

- 2. Type: fence post footings, thrust blocks
 - a. Required Strength: 2500 psi
 - b. Minimum 7 Day Test: 1500 psi
 - c. Minimum 28 Day Test: 2500 psi
- 3. Type: flagpole footings, equipment pads, block wall footings
 - a. Required Strength: 3000 psi
 - b. Minimum 7 Day Test: 1800 psi
 - c. Minimum 28 Day Test: 3000 psi

3.09 CLEANING OR REPAIR

- A. Formwork Cleaning:
 - 1. Remove dirt, chips, sawdust, nails, and other foreign matter from the forms before concrete is placed.
 - 2. Previously used forms shall be thoroughly cleaned of all dirt, mortar, and other foreign matter before reusing.
- B. Upon completion of other work, clean exterior finished concrete surfaces.
- C. Areas shall be swept and cleaned.
- D. Remove from the premises surplus material, equipment and debris that result from this work.

END OF SECTION 32 13 13

PAVING ACCESSORIES AND STRIPING **SECTION 32 17 00**

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1;
 - 2. Concrete wheel stops;
 - 3. Road and Parking Barriers;
 - 4. Traffic and court striping and markings;
 - 5. Curb painting and markings;
 - 6. Accessories and associated hardware;
 - 7. Submittal preparation;
 - 8. Clean up.

B. Related Sections:

- **Exterior** Painting
- Section 09 91 13:
 Section 32 12 16: Asphaltic Concrete Paving
- 3. Section 32 32 13: Site Concrete

1.02 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product or Material Data:
 - 1. Submit copies of product data sheets.
 - 2. Submit copies of agency product to be incorporated into the work.
- C. Samples or Mockups:
 - 1. Submit one (1) sample of the manufacturer's complete color range to the Architect for color selection purposes prior to ordering material.

1.03 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Maintain material safety data sheets for materials used.
 - 2. File onsite in a central location.
 - 3. Comply with the requirements of local agencies having jurisdiction over matter dealing with air quality.
- B. Qualifications:
 - 1. Work shall be performed only by individuals with specific knowledge and experience in this type of work.

- C. Warranty:
 - 1. Warranty materials and application for one (1) year.
 - 2. Defects or areas of excessive wear that appear within one year shall be repaired or reworked by contractor at no additional cost.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Concrete Wheel Stops:
 - 1. Bakersfield Precast; Bakersfield, CA.
 - 2. Or approved equal.
- B. Traffic Paint:
 - 1. Dunn Edwards Paints; Commerce, CA.
 - 2. Sherwin Williams; Cleveland, OH.
 - 3. Or approved equal.

2.02 MATERIALS

- A. Concrete wheel stops shall have a minimum compressive strength of 4000 psi and a minimum of two (2) #3 reinforcing bars in each unit for general automobile spaces. For truck and heavy vehicle stops, the stops shall be larger, 7" high x 12" wide x 6'-0" long, especially suited for larger vehicles and contain 4 #4 bars.
 - 1. Bars shall be full length of unit less 2" for cover.
 - 2. Cure for a minimum of 28 days prior to installation.
- B. Road and Parking Barriers:
 - 1. Bollards: Fabricated from 6" diameter standard steel pipe and closed top of pipe with welded steel plate. Grind all edges smooth.
 - a. Provide eyebolt welded to bollard for use to lock single gate with chain.
 - 2. Swinging Gates: Fabricated from 3" diameter standard steel pipe. Weld pipe to form gate and grind all edges smooth.
 - a. Provide eyebolt welded to gate(s) for use to lock gate(s) with chain.
- C. Traffic line and court marking paint shall be Sherwin Williams, Setfast Acrylic Latex or Latex (TM series) Traffic Marking Paints as follows:
 - 1. TM2160 WHITE
 - 2. TM2161 LEAD FREE YELLOW
 - 3. TM2132 RED
 - 4. TM2133 BLUE Meeting Fed. Spec. Color #15090, Fed. Std. 595B
 - 5. TM2135 BLACK

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify layout prior to beginning work.
- B. Start of work shall be considered as acceptance of existing conditions.

3.02 DELIVERY, STORAGE, AND HANDLING

- A. Materials shall be transported, handled, and stored in conformance with the manufacturer's recommendations.
- B. Materials shall be delivered and stored in their original, unopened containers until they are incorporated into the work.

3.03 SEQUENCING AND SCHEDULING

A. When applicable, coordinate work with the schedule established by the Construction Manager or Contractor.

3.04 INSTALLATION OR APPLICATION

- A. Wheel Stops (Parking Bumpers):
 - 1. Install at proper angles and in proper locations to prevent over-travel of vehicles.
 - 2. Embed wheel stops to pavement on a layer of mastic.
 - 3. Fix wheel stops into position with two (2) 1/2" rods driven a minimum of 24" into paving and base.
- B. Road and Parking Barriers:
 - 1. Set pipe standard for parking barricades in minimum 12" diameter by 30" deep concrete-filled holes, unless otherwise indicated. Set pipe plumb. Temporarily brace as required to maintain alignment until concrete sets.
 - 2. Set top of pipe bollards at 42" above finish grade, unless otherwise indicated.
 - 3. Bollards shall be solid filled with concrete with domed cap, or welded plate cap.
 - 4. Bollards shall be painted a gloss caution yellow unless noted otherwise.
- C. Traffic Lines and Court Markings:
 - 1. Install per the manufacturer's latest written recommendations.
 - 2. Apply traffic paint to clean dry surfaces.
 - 3. Apply paint at the manufacturer's recommended rate of application.
 - 4. Use mechanical equipment to apply paint in straight uniform lineage.

- D. Pavement Markings:
 - 1. Painted lines shall be a minimum of 4" wide.
 - 2. Crosswalk and limit lines shall be a minimum of 12" wide unless noted otherwise
 - 3. Parking spaces for the Disabled shall be marked according to 2022 CBC Sections 11B-208 and 11B-502. Paint perimeter lines of the loading zone blue with white diagonal lines. Paint the 12" high "NO PARKING" letters white on a blue background.
- E. Curb Markings:
 - 1. Bus Loading:
 - a. Paint curbs yellow.
 - b. Stencil "BUS LOADING ONLY" onto curb at 25 feet on center.
 - 1) Use 2-inch high black letters on a yellow background.
 - 2. Student Loading:
 - a. Paint curbs yellow.
 - b. Stencil "PASSENGER LOADING ONLY NO PARKING" onto curb at 25 feet on center.
 - 1) Use 2-inch high black letters.
- F. Fire Lanes:
 - 1. Paint curbs red.
 - Stencil "FIRE LANE NO PARKING" onto curb at 30 feet on center.
 a. Use 2-inch high white letters on a red background.
- G. Accessible Parking Spaces:
 - 1. Paint the wheel stops blue.

3.05 PROTECTION OR ADJUSTMENTS

- A. Protect work until final acceptance.
- B. Remove wheel stops that have been damaged and replace with new.
- C. Patching of concrete stops will not be permitted.
- D. Repaint damaged or faded lines and markings.

3.06 CONDITION OF FINISHED WORK

- A. The completed installation shall comply with approved plans.
- B. Lines shall be straight, true, and uniform.
- C. Over-spray shall not be permitted.

3.07 SCHEDULES

A. Line Color Schedule: 1. Parking stripes: White 2. Accessibility markings: Blue 3. Fire lane markings: Red 4. Bus loading markings: Yellow 5. Student loading markings: Yellow 6. EV Parking: White

END OF SECTION 32 17 00

TACTILE WARNING SURFACING SECTION 32 17 26

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

- 1. Provisions set forth in Divisions 0 and 1.
- 2. Furnishing and installing cast-in-place tactile tile modules where indicated.
- 3. Shop drawing and submittals.
- 4. Clean-up.
- B. Related Documents:
 - 1. Section 32 13 13: Site Concrete Paving

1.02 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO)
 - 1. AASHTO Standard HB-17:
 - 2. AASHTO Standard HS-20:
- B. ASTM International (ASTM)
 - 1. ASTM B117 Standard Practice for Operating Salt Spray (Fog) Apparatus.
 - 2. ASTM C501 Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser.
 - 3. ASTM D543 Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents.
 - 4. ASTM D570 Standard Test Method for Water Absorption of Plastics.
 - 5. ASTM D638 Standard Test Method for Tensile Properties of Plastics.
 - 6. ASTM D695 Standard Test Method for Compressive Properties of Rigid Plastics.
 - 7. ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - 8. ASTM D1037 Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.
 - 9. ASTM D2486 Standard Test Method for Scrub Resistance of Wall Paints.
 - 10.ASTM D5420 Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Fallin Weight (Gardner Impact).
 - 11. ASTM G155 Standard Practice for Operating Xenon Arc Lamp Apparatus for Exposure of Materials.
- C. 2022 California Code of Regulations (CCR) Title 24, Part 2
 - 1. Chapters 2 "Definitions" and 11B "Accessibility to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product Data: Submit manufacturer's literature describing products, installation procedures, and routine maintenance.
- C. Samples for Verification Purposes: Submit two (2) tile samples minimum 6" x 8" of the kind proposed for use.
- D. Shop drawings are required for products specified showing fabrication details; composite structural system; plans of tile placement, including joints and material to be used, as well as outlining installation materials and procedures.
- E. Material Test Reports: Submit test reports from qualified independent testing laboratory indicating that materials proposed for use are in compliance with requirements and meet the properties indicated. All test reports shall be conducted on a cast-in-place tactile tile system as certified by a qualified independent testing laboratory.
- F. Maintenance Instructions: Submit copies of manufacturer's specified maintenance practices for each type of tactile tile and accessory as required.

1.04 QUALITY ASSURANCE

- A. Provide cast-in-place tactile tiles and accessories as produced by a single manufacturer.
- B. Installer's Qualifications: Engage an experienced installer certified in writing by tactile manufacturer as qualified for installation, who has successfully completed tile installation similar in material, design, and extent to that indicated for Project.
- C. Americans with Disabilities Act (ADA): Provide tactile warning surfaces which comply with the detectable warnings on walking surfaces section of the Americans with Disabilities Act (CBC 2022, Section 11B-705 "Detectable Warnings and Detectable Directional Texture").
- D. California Code of Regulations (CCR): Provide only approved DSA AC detectable warning products as provided in the California Code of Regulations (CCR) Title 24, Part 1, Articles 2, 3 and 4 and Part 2, Chapter 2, Section 202 definition of "Detectable Warning", Chapter 11B, Sections 11B-406 "Curb Ramps", 11B-247 and 11B-705 "Detectable Warnings and Detectable Directional Texture."

- E. Vitrified Polymer Composite (VPC) Cast-in-Place Tiles embedded in concrete shall meet or exceed the following test criteria:
 - 1. Accelerated Aging and Freeze Thaw Test of Tile when tested to ASTM D1037 shall show no evidence of cracking, delamination, warpage, checking, blistering, color change, loosening of tiles, or other defects.
 - 2. Salt and Spray Performance of Tile and Adhesive System when tested to ASTM B117 not to show any deterioration or other defects after 100 hours of exposure.

1.05 PROJECT CONDITIONS

- A. Environmental Condition and Protection: maintain minimum temperature of 40 degrees F in spaces to receive tactile tiles for at least 48 hours prior to installations, during installation, and for not less than 48 hours after installation. Store tactile tile material in spaces where they will be installed for at least 48 hours before beginning installation. Subsequently, maintain minimum temperature of 40 degrees F in areas where work is completed.
- B. The use of water for work cleaning or dust control, etc. shall be contained and controlled and shall not be allowed to come into contact with the passengers or public. Provide barricades or screens to protect passengers or public.
- C. Disposal of any liquids or other materials of possible contamination shall be made in accordance with federal, state, and local laws and ordinances.
- D. Cleaning material shall have code-acceptable low VOC solvent content and low flammability if used on the site.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Tiles shall be suitably packaged or crated to prevent damage in shipment or handling. Finished surfaces shall be protected by sturdy wrapping and tile type shall be identified by part number.
- B. Tiles shall be delivered to location at building site for storage prior to installation.

1.07 EXTRA STOCK

A. Deliver extra stock to storage area designated by engineer. Furnish new materials from same manufactured lot as materials installed and enclosed in protective packaging with appropriate identification for cast-in-place tactile tiles. Furnish not less than two (2) percent of the supplied materials for each type, color, and pattern installed.

1.08 GUARANTEE

A. Cast-in-place tactile tiles shall be guaranteed in writing for a period of five years from the date of Notice of Completion. The guarantee includes defective work, breakage, deformation, and loosening of tiles.

PART 2 PRODUCTS

2.01 MANUFACTUERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work, include, but are not limited to, the following:
 - 1. Acceptable manufacturers:
 - a. ADA Solutions; Jefferson, OH.
 - b. Armor-Tile Tactile System, Inc.; Elgin, IL.
 - c. Or approved equal.
- B. Basis of Design:
 - 1. Armor-Tile Tactile System; Cast-in-Place Tile.

2.02 MATERIALS

- A. Vitrified Polymer Composite (VPC) cast-in-place tiles shall be an epoxy polymer composition with ultraviolet stabilized coating employing aluminum oxide particles in the truncated domes 0.2" in height, 0.9" diameter at the base, and 0.4" diameter at top of dome, spaced 2.35" nominal as measured on a diagonal, and 1.70" nominal as measured side by side. For wheelchair safety, the field area shall consist of a non-slip surface with a minimum of 40 - 90 degree raised points 0.045" high per square inch.
 - 1. Dimensions: Tiles shall be held within the following dimensions and tolerances:
 - a. Length and Width: 12" x 12"
 - 1) Depth: 1.400" +/- 5% max.
 - 2) Face Thickness: 0.1875 +/- 5% max.
 - 3) Warpage of Edge: +/- 0.5% max.
 - b. Length and Width: 24" x 24"
 - 1) Depth: 1.400" +/- 5% max.
 - 2) Face Thickness: 0.1875 +/- 5% max.
 - 3) Warpage of Edge: +/- 0.5% max.
 - c. Length and Width: 24" x 36"
 - 1) Depth: 1.400" +/- 5% max.
 - 2) Face Thickness: 0.1875 +/- 5% max.
 - 3) Warpage of Edge: +/- 0.5% max.

- d. Length and Width: 24" x 48"
 - 1) Depth: 1.400" +/- 5% max.
 - 2) Face Thickness: 0.1875 +/- 5% max.
 - 3) Warpage of Edge: +/- 0.5% max.
- e. Length and Width: 24" x 60"
 - 1) Depth: 1.400" +/- 5% max.
 - 2) Face Thickness: 0.1875 +/- 5% max.
 - 3) Warpage of Edge: +/- 0.5% max.
- f. Length and Width: 36" x 48"
 - 1) Depth: 1.400" +/- 5% max.
 - 2) Face Thickness: 0.1875 +/- 5% max.
 - 3) Warpage of Edge: +/- 0.5% max.
- g. Length and Width: 36" x 60"
 - 1) Depth: 1.400" +/- 5% max.
 - 2) Face Thickness: 0.1875 +/- 5% max.
 - 3) Warpage of Edge: +/- 0.5% max.
- 2. Water absorption of tile when tested by ASTM D570 not to exceed 0.35%.
- 3. Slip resistance of tile when tested by the combined wet/dry static co-efficient of friction not to be less than 0.80 on top of domes and field area.
- 4. Compressive strength of tile when tested by ASTM D695-91 not to be less than 18,000 psi.
- 5. Tensile strength of tile when tested by ASTM D638-91 not to be less than 10,000 psi.
- 6. Flexural strength of tile when tested by ASTM C293-94 not to be less than 24,000 psi.
- 7. Chemical stain resistance of tile when tested by ASTM D543-87 to withstand without discoloration or staining 1% hydrochloric acid, urine, calcium chloride, stamp pad ink, gum, and red aerosol paint.
- 8. Abrasive wear of tile when tested by BYK Gardner Tester ASTM D 2486* with reciprocating linear motion of 37 +/- cycles per minute over a 10" travel. The abrasive combined mass of the sled, weight, and wood block to be 3.2 lb. Average wear depth shall not exceed 0.030 after 1000 abrasion cycles measured on the top surface of the dome representing the average of three measurement locations per sample.
- 9. Fire resistance: when tested to ASTM E84 flame spread be less than 25.
- 10. Gardner impact to geometry "GE" of the standard when tested by ASTM D5420-93 to have a mean failure energy expressed as a function of specimen thickness of not less than 450 in. lbf./in. A failure is noted if a hairline fracture is visible in the specimen.
- 11. Accelerated weathering of tile when tested by ASTM G26-95 for 2000 hours shall exhibit the following result no deterioration, fading, or chalking of surface of tile.
- 12. Embedment flange spacing shall be 3.0" minimum to 3.1" maximum center-tocenter spacing as illustrated on product drawing.

13. Color: Yellow conforming to Federal Color No. 33538. Color shall be homogenous throughout the tile.

PART 3 EXECUTION

3.01 INSTALLATION

- A. During the installation procedures, ensure adequate safety guidelines are in place, and that they are in accordance with the applicable industry and government standards.
- B. The specifications of the structural adhesives, fasteners, and related materials shall be in strict accordance with the contract documents and the guidelines set by their respective manufacturers.
- C. The physical characteristics of the concrete shall be consistent with the contract specifications, while maintaining a slump range of 4-7 to permit solid placement of the Cast-in-Place Tile System. An overly wet mix will cause the Cast-in-Place System to float. Under these conditions, suitable weights such as 2 concrete blocks or sandbags (25 lbs.) shall be placed on each tile.
- D. Prior to placement of the Cast-In-Place System, the contract drawings shall be reviewed.
- E. The concrete pouring and finishing operations require typical mason's tools, however, a 4' long level with electronic slope readout, 25 lb. weights, and a large non-marring rubber mallet are specific to the installation of the Cast-In-Place System. A vibrating mechanism, such as that manufactured by Vibco, can be employed, if desired. The vibrating unit should be fixed to a soft base, such as wood, at least 1 foot square.
- F. The factory-installed plastic sheeting must remain in place during the entire installation process to prevent the splashing of concrete onto the finished surface of the tile.
- G. When preparing to set the tile, it is important that NO concrete be removed in the area to accept the tile. It is imperative that the installation technique eliminates any air voids under the tile. Holes around the tile perimeter allow air to escape during the installation process. Concrete will flow through the large holes in each vane on the underside of the tile. This will lock the tile solidly into the cured concrete.
- H. The concrete shall be poured and finished true and smooth to the required dimensions and slope prior to the tile placement. Immediately after finishing concrete, the electronic level should be used to check that the required slope is

achieved. The tile shall be placed true and square to the curb edge in accordance with the contract drawing. The cast-in-place tiles shall be tamped (or vibrated) into the fresh concrete to ensure that the field level of the tile is flush to the adjacent concrete surface. The contract drawings indicate that the tile field level (base of truncated dome) is flush to adjacent surfaces to permit proper water drainage and eliminate tripping hazards between adjacent finishes.

- I. Immediately after tile placement, the tile elevation is to be checked to adjacent concrete. The tile elevation and slope should be set consistent with contract drawings to permit water drainage to curb as the design indicates.
- J. While concrete is workable, a 3/8" radius edging tool shall be used to create a finished edge of concrete, then a steel trowel shall be used to float the concrete around the tile's perimeter, flush to the field level of tile.
- K. During and after the tile installation and the concrete curing stage, it is imperative that there is no walking, leaning, or external forces placed on the tile to rock the tile, causing a void between the underside of tile and concrete.
- L. Following tile placement, review installation tolerances to contract drawings and adjust tile before the concrete sets. Two suitable weights of 25 lb each shall be placed on each tile as necessary to ensure solid contact of the underside of tile to concrete.
- M. Following the curing of the concrete, protective plastic wrap is to be removed from the tile face by cutting the plastic with a sharp knife, tight to the concrete/tile interface. If concrete bled under the plastic, a soft wire brush will clean the residue without damage to the tile surface.
- N. If desired, individual tiles can be bolted together using 1/4 inch or equivalent hardware. This can help to ensure that adjacent tiles are flush to each other during the installation process. Tape or caulking can be placed on the underside of the bolted butt joint to ensure that concrete does not ooze up between the tiles during installation. Any protective plastic wrap, which was peeled back to facilitate bolting or cutting, should be replaced and taped to ensure that the tile surface remains free of concrete during the installation process.
- O. Tiles can be cut to custom sizes, or to make a radius, using a continuous rim diamond blade in a circular saw or mini-grinder. Use of a straightedge to guide the cut is advisable where appropriate.
- P. Any sound-attenuating plates on the underside of the tile, which are dislodged during handling or cutting should be replaced and secured with construction adhesive. The air gap created between these plates and the bottom of the tile is important in preserving the detectability properties of the tile.

3.02 CLEANING AND PROTECTING

- A. Protect tiles against damage during construction period to comply with tactile tile manufacturer's specifications.
- B. Protect tiles against damage from rolling loads following installation by covering with plywood or hardwood.
- C. Clean tactile tiles not more than four days prior to date scheduled for inspection intended to establish date of substantial completion in each area of project. Clean tactile tile by method specified by tactile tile manufacturer.

END OF SECTION 32 17 26

CHAIN LINK FENCES AND GATES **SECTION 32 31 13**

PART1 GENERAL

1.01 SUMMARY

A. Inclusions:

- 1. Provisions set forth in Divisions 0 and 1.
- 2. Chain link fencing.
- 3. Posts, headrails, braces, fittings, fabric, hardware, gates, and accessories.
- 4. Excavation and backfill for chain link fence work.
- 5. Fence and gate post footings.
- 6. Submittal preparation.
- 7. Clean up.
- B. Related Sections:
 - 1. Section 05 74 00: **Ornamental Metal Work**
 - 2. Section 10 14 56: Site Signage
 - Earthwork
 - Section 31 22 00:
 Section 32 13 13: Site Concrete Paving

1.02 REFERENCES

- A. ASTM International (ASTM)
 - 1. ASTM A120 Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Ordinary Uses.
 - 2. ASTM D520 Standard Specification for Zinc Dust Pigment.
- B. California Building Code (CBC)
 - 1. Chapter 11B, Section 404 Doors, Doorways and Gates.

1.03 SUBMITTALS

- A. Product and Shop Drawings:
 - 1. Submit copies of product data and shop drawings to the Architect for review prior to fabrication or installation.

1.04 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. All pass gates shall comply with exit door and general door requirements set forth by the California Building Code (landings, hardware, panic hardware, kickplate, strike edge clearance and clear opening). 2022 CBC Section 11B-404.
 - 2. Grounds may be fenced, and gates therein equipped with locks, provided safe dispersal areas are located not less than 50 feet from buildings. Dispersal areas shall be sized to provide an area of not less than three (3) square feet per occupant. Gates shall not be installed across corridors or passageways leading to such dispersal areas, unless they comply with exit requirements.

- B. Qualifications:
 - 1. Workmen shall be experienced in their respective trades.
 - 2. Chain link fabric shall withstand six (6) one-minute immersions using the Preece Test.
 - a. Test section:
 - 1) At least four inches (4") in length.
 - 2) Include at least one bend and one straight side of the formed link.
 - 3) Framework Material shall withstand twelve (12) one-minute immersions under the Preece test.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable manufacturers:
 - 1. US Steel Corporation Cyclone;
 - 2. Alcorn Fence;
 - 3. Or approved equal.

2.02 MATERIALS

- A. Fencing:
 - General Fence Schedule: Refer to site drawings for scope.
 a. Interior Fencing: 6'-0" high
 - 2. Fabric:
 - a. Wire, hot-dip zinc-coated after weaving.
 - b. No. 9 gauge wire.
 - 1) Tensile strength of 70,000 pounds per square inch.
 - c. 2" nominal mesh size.
 - d. Knuckle-knuckle top edge.
 - 3. Posts:
 - a. General: Conform to ASTM A120 Schedule 40.
 - 1) Class 1 Steel Pipe, Grades A and B.
 - 2) 1.2 ounce zinc-coated.
 - b. Terminal Posts:
 - 1) End, corner, and pull posts.
 - 2) Size per Post Schedule, unless noted otherwise.
 - c. Gate Posts:
 - 1) Size per Post Schedule, unless noted otherwise.
 - d. Line Posts:
 - 1) Vertical posts between terminal posts.
 - 2) Size per Post Schedule, unless noted otherwise.
 - e. Top Rail and Bracing:
 - 1) Top Rail shall be 1-1/4" hot-dip galvanized Schedule 40 pipe.
 - a) Weight 2.27 pounds per linear foot.

- 2) Brace end and corner posts with Brace Rail matching Top Rail.a) Provide 3/8" galvanized rod bracing with turnbuckle at end posts.
- 3) Bottom bracing shall be No. 7 coil spring tension wire at bottom of fence.
- f. Fabric Bands:
 - 1) Fabric at end and corner posts
 - 2) Fabric shall be fastened with bands to end, corner and line posts at twenty-four inch (24") centers.
 - 3) Fabric shall be fastened with ties to top rail, stretcher bar or bottom bracing wire at twelve (12") centers.
- g. Gates:
 - 1) Gate Frames:
 - a) Hot-dip galvanized pipe two inches (2") O.D per linear foot.
 - b) 1-1/2" diameter welded cross brace per leaf.
 - c) Weld corners.
 - d) Hot-dip galvanized after assembly.
 - 2) Fabric:
 - a) Fabric to be same as fence.
- h. Concrete:
 - 1) One part Portland cement to 2-1/2 parts of sand, to 3-1/2 parts 3/4" aggregate.
 - 2) Comply with Section 32 13 13 "Site Concrete".

2.03 ACCESSORIES OR HARDWARE

- A. Latches:
 - 1. Plunger bar-type with attachments for padlock locking.
- B. Post Tops:
 - 1. Hot-dip galvanized fittings with heavy steel tops.

C. Hinges and Catches:

- 1. Heavyweight malleable iron.
- 2. Single gate to have a fork latch with padlock attachment.
- D. Fittings:
 - 1. Heavyweight malleable wrought iron or heavyweight pressed steel.
 - 2. Hot-dip galvanized.
- E. Rolling Gates:
 - 1. Heavy duty track, ball bearing hanger sheaves, overhead framing and supports, guides, stays, bracing, and all accessories for a complete operational gate.
- F. Slats:
 - 1. Provide redwood or vinyl slats where indicated on Drawings.

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- G. Galvanized Finish Repair:
 - Repair compound: ASTM D 520, Type III high purity grade zinc dust.
 24 lbs/gallon minimum weight per gallon. 52% by volume minimum solids content. 94% by weight in dry film minimum metallic zinc content. Galvilite Galvanizing Repair, ZRC Worldwide. (800) 831-3275.
 - 2. RotoMetals Regalv lead free galvanizing repair stick. Heat applied.

2.04 FINISH

- A. All components:
 - 1. Heavy galvanized.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Take measurements of the buildings, and site verify the dimensions.
 - 1. Report any deviations between existing site conditions and the drawings or specifications.

3.02 PREPARATION

A. Properly locate fencing within the property lines.

3.03 INSTALLATION OR APPLICATION

- A. Posts:
 - 1. Set line posts 2'-3" in concrete base.
 - a. Concrete base shall be 2'-6" deep x 12" diameter.
 - b. Maintain at least three inches (3") concrete below bottom of post.
 - Set gate and corner post 2'-9" in concrete base.
 a. Concrete base shall be 3'-0" deep x 12" + pipe diameter.
- B. Terminating posts, gate posts, and corner posts shall have a horizontal brace installed at mid-height and have a 3/8" solid diagonal brace rod with turnbuckle in each adjacent bay.
- C. Fabric:
 - 1. Fasten to end corner and gate posts with 1/4" x 3/4" stretcher bars.
 - a. Not less than 1/8" x 3/4" wide stretch bar bands at one foot (1'-0") center to center.

3.04 CLEANING OR REPAIR

A. Remove excess soil, debris, rubbish, etc., resulting from the work of this Section.1. Legally dispose offsite.

3.05 CONDITION OF FINISHED WORK

- A. Headrails and top of fabric shall be level and true-to-line.
- B. Posts shall be true-to-line and spaced not over ten-foot (10'-0") centers, or where shown on plans.
- C. Accessories and appurtenances shall be installed, complete, and satisfactory.
- D. Repair all damaged galvanized material with approved/specified repair material. Manufacturer's requirements for prep and application shall be strictly followed.

3.06 POST FOOTINGS

- A. Gate post footings shall be 36" deep and a minimum diameter of post diameter plus 12".
- B. Line post footings shall be 30" deep and 12" diameter
- C. Terminal post footing shall be 36" deep and 12" diameter
- D. Dimension may be taken from top of paving or grade

3.07 POST SCHEDULES

A. Gate # as indicated on Drawings:

Post/Gate#	Height	Spacing/ Opening Width	#Leaves	Sch.40 post O.D.	Post weight per foot
Line	6 ft or less	10'-0"	n/a	2.87"	5.79#
Terminal	6 ft or less	10'-0"	n/a	3.5"	7.58#
G05	6'-0"	36'-6"	2	8.62"	28.55#
G08	6'-0"	30'-0"	2	6.62"	18.97#

END OF SECTION 32 31 13

IRRIGATION SECTION 32 80 00

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. All labor, materials, tools and the transportation and performance of all the work required as indicated on the Drawings and Specifications and reasonably incidental to:
 - 1. Connection to water supply at point of connection indicated on plans.
 - 2. Irrigation mains, laterals and couplings.
 - 3. Automatic controllers and wiring.
 - 4. Electric control valves.
 - 5. Sprinkler heads and swing joints.
 - 6. Fertigation unit assembly
 - 7. Valve boxes.
 - 8. All related trenching and backfilling.

1.02 RELATED WORK

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

1.03 QUALITY ASSURANCE

- A. Examine all sections of Specifications and Drawings for Work related to this Section.
- B. Install irrigation system in accordance with all applicable codes and regulations. Installer shall have had considerable experience and demonstrate ability in the installation of irrigation systems of specified type(s) in a neat, orderly, and responsible manner in accordance with recognized standards of workmanship.
- C. Contractor shall check static pressure at the irrigation point of connection to the water supply before beginning work and notify Landscape Architect in writing of the pressure available.
- D. Contractor shall notify the Landscape Architect and the Inspector 5 working days in advance when each work phase is ready to be inspected.
- E. Contractor shall provide "As-Built "plans for the irrigation system per the General Conditions and prior to final acceptance of work. In addition, (1) colored coded controller chart bond copy shall be reduced in size, laminated with vinyl film, and placed in the controller enclosure, and two full size photo mylar copies shall be provided to the District.
- F. The Contractor shall maintain continuous power and water supply to all facilities that are directly or indirectly affected by this construction, unless other arrangements are made with the District for temporary shut-offs.
- G. The Contractor shall protect the public health, safety and welfare during all phases of the work.

- H. Contractor's price shall include an amount to install five (5) additional sprinkler heads of each type and one (1) additional valve of each type and size from that quantity shown on the drawings at no additional cost to the District. Nozzle changes to accommodate existing conditions shall be provided at no additional cost to the District. All unused additional sprinklers shall be delivered to the District as spares prior to final payment.
- I. Crew Training for Solvent Weld PVC & Mechanical joint restraint Installation:
 - 1. The Contractor shall be required to provide crew members that will install PVC for mandatory training and certification. Contractor shall schedule training a minimum of 10 days prior to the installation of any pipe on the site.
- J. All meetings, including training, shall be conducted in English. The Contractor shall provide an interpreter, at the Contractors expense, to translate for his/her non-English or poor English speaking representative(s).

1.04 GUARANTEE

A. Contractor shall provide a one (1) year guarantee from the filing date of the Notice of Completion and Final Acceptance of the Work. Any pipes, valves, heads, planting, and paving, which has settled shall be reinstalled to the proper level at no cost to the District. Completely restore all damaged planting, paving, or other improvements.

1.05 INSTRUCTION, TRAINING AND SUPPORT

A. Provide instruction to the District 's maintenance personnel in the operation and maintenance of the system. All warranties, product data and manuals shall be bound together with 8 1/2" by 11" reduced site irrigation plans showing zones in 9" by 12" black 3 ring binders. Contractor is to provide for one year of on-site technical support and continuing training after the filing date of the Notice of Completion by the District at no additional cost to the District.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Rainbird Sprinkler Mfg.
- B. Hunter Industries
- C. Applied Engineering
- D. Febco Irrigation
- E. Flowmec
- F. Leemco
- G. Matco
- H. Paige Wiring
- I. 3M

2.02 MATERIALS

- A. All materials shall be as indicated on the plan, irrigation schedule and as specified herein.
- B. Piping and Fittings:
 - 1. Polyvinyl chloride pipe:
 - ASTM D2241, rigid, unplasticized PVC, extruded from virgin parent material. Provide pipe homogeneous through and free from visible cracks, holes, foreign materials, blisters, wrinkles, and dents.
 (1) Main line: CI 200 PVC.
 - (2) Lateral Lines: Schedule 40 PVC.
 - 2. PVC pipe fittings:
 - a. Fittings for Schedule 40 PVC shall be ASTM D2241 Schedule 40 PVC molded fittings suitable for solvent weld, slip joint Ring Tite seal or screwed connections. Fittings made of other materials are not permitted.
 - (1) Sleeve main and lateral lines below walks and paving.
 - (2) PVC schedule 40 fittings w/ glued joints shall be utilized. The glue manufacturer shall furnish training for landscape contractor. Staff personnel shall be certified and wear a photo ID after receiving training.
 - (3) Size slip fitting socket taper to permit a dry unsoftened pipe end to be inserted no more than halfway into the socket. Saddle and cross fittings are not permitted.
 - (4) Use male adapters for plastic to metal connections. Handtighten male adapters plus one turn with a strap wrench.
- C. Controller Wires:
 - 1. Shall be solid copper conductors, 600 volt AC, Type UF-AWG, UL approved for direct burial. Common wire to be # 12 AWG size; station wires to be # 14 AWG size, minimum.
 - 2. Wires shall be placed adjacent to irrigation mains wherever practical within grey schedule 40 PVC conduit throughout the project.
- D. Master Valve/Flow Sensor assembly: Contractor is to connect the unit to the irrigation controller as per manufacturer's recommendations.
- E. Tracer Wire: All water pressure lines to be installed with #12 tracer wire except where control wires are located adjacent to pressure lines.
- F. Utility Marker Tape: Any control wires that do not follow irrigation pipes shall be 24 inches deep and marked with continuous utility marking tape located 6 inches below finish grade.
- G. Solvent: ASTM D2466 recommended by manufacturer of approved pipe.
- H. Controllers Rainbird LXME2 Pro with IQ communication cartridge as specified on plans.
 - 1. Each controller shall be installed with a separate common wire. Common wires cannot be shared between controllers.
 - 2. Locate controllers adjacent to provide power supply as indicated on plans.

- I. Control Valves: Remote Control Valves.
 - 1. Provide valves with pressure regulating feature for all tree bubbler and drip bubbler systems, unless insufficient pressure is available.
 - 2. Provide identification tag attached to valves indicating valve/station number as shown on drawings. Rainbird valve tags model #VID1Y24
 - 3. Locate valve boxes a maximum of 2' from curbs or hardscape.
 - 4. Do not provide swing joints on control valves. At all irrigation valve installations, turn PVC tee from main line to valve 90 degrees so the tee faces to the side. Size to match valve size.
 - 5. Schedule 80 TOE ("threaded one end") nipples are the only acceptable method of attaching threaded inlet/outlet valves to all irrigation piping and/or fittings. At no time shall SCH 40 male adapters be used on any threaded valves to main lines.
- J. Heads
 - 1. Install two deep root watering systems per tree.
 - 2. Install one deep root watering system per shrub.
- K. Valve boxes: Valve box shall be as specified on plans.

2.03 RAIN SENSOR

A. Automatic Shut Off: Rain Guard Shut Off Device Model as specified on plans.

2.04 VALVE TAGS

A. Shall be by T. Christy Enterprises, standard size tags, which shall be irrigation yellow color with controller letter and valve numbers hot stamped in black (i.e.: A-1 for controller A – Valve #1). ID Tags shall be installed prior to the punch list review.

2.05 TRENCHES

- A. Fill to match adjacent grade elevations with approved earth fill material. Place and compact fill in layers not greater than 6" depth. Provide compaction of 95% over main lines where they cross under areas with concrete or AC paving. Compact all other trenches backfill to 85%.
- B. Trench depth shall be minimum 18" deep for pressure lines. Lateral lines shall be a minimum of 12" deep. Under paving trench depth shall be a minimum of 24" deep. Maintain 12" of horizontal clearance between lines of other trades.

PART 3 – EXECUTION

3.01 INSPECTION

A. Examine final grades and installation conditions. Do not start irrigation system work until unsatisfactory conditions are corrected.

3.02 PREPARATION

- A. Layout and stake the location of each pipe run and all sprinkler heads and sprinkler valves. Obtain Landscape Architect's acceptance of layout prior to excavating.
- B. Strip sod for pipe trenches with a mechanical sod stripper uniformly 1" to 1-1/2" thick with clean cut edges.
- C. Place sleeves as indicated for installation of piping and conduit for control wires.

3.03 INSTALLATION

- A. Excavating and backfilling:
 - 1. All excavation shall be considered unclassified excavation and include all materials encountered.
 - 2. Excavate trenches to depth and width indicated on drawings to permit proper handling and installation of pipe and fittings.
 - 3. Fill to match adjacent grade elevations with approved earth fill material. Place and compact fill in layers not greater than 6" depth.
 - 4. Provide compaction of 95% over main lines where they cross under areas with concrete or AC paving. Compact all other trenches backfill to 90%.
 - 5. Replace stripped sod in sufficient time to allow for satisfactory sod recovery and growth. Water stripped and reinstalled sod until irrigation system is placed in operation.
 - 6. Replace paving of same materials, using joints and patterns to match existing adjoining paving surfaces.
- B. Plastic Pipe:
 - 1. Install plastic pipe in accordance with manufacturer's installation instructions. Provide for thermal expansion and contraction.
 - 2. Saw cut plastic pipe. Use a square-in sawing vice, to insure a square cut. Remove burrs and shavings at cut ends prior to installation.
 - 3. Make plastic-to-plastic joints with solvent weld joints for slip seal joints. Use only solvent recommended by the pipe manufacturer. Install plastic pipe fittings in accordance with pipe manufacturer's instructions. Contractor shall make arrangements with pipe manufacturer for all necessary field assistance.
 - 4. Make plastic to metal joints with plastic male adapters.
 - 5. Make solvent weld joints in accordance with manufacturer's recommendations.
 - 6. Allow joints to set at least 24 hours before pressure is applied to the system.
 - 7. Maintain pipe interiors free of dirt and debris. Close open ends of pipe by acceptable methods when pipe installation is not in progress.

- C. Sprinklers, fittings, valves, and accessories:
 - 1. Install fittings, valves, bubblers, risers and accessories in accordance with manufacturer's instructions, except as otherwise indicated.
 - 2. Set bubblers perpendicular to finished grade and 2 inches from pavement edge, except as otherwise indicated. Nozzle changes shall be made at no cost to the District.
 - 3. Obtain Landscape Architect's review and acceptance of height for proposed sprinkler heads and valves prior to installation.
 - 4. Locate sprinkler heads to assure proper coverage of indicated areas. Do not exceed sprinkler head spacing distance indicated.
 - 5. Install controller(s) as detailed.
 - 6. Install in-ground control valves in a valve access box as indicated.
 - 7. Install valve access boxes on a suitable base of gravel to provide a level foundation at proper grade and to provide drainage of the access box.
 - 8. Seal threaded connection on pressure side of control valves with Teflon tape or approved plastic joint type compound.
- D. Control Wiring:
 - 1. Install control wire in the piping trenches wherever possible.
 - a. Place control and common wires within grey sch 40 conduit in trench adjacent to irrigation mainline pipe as per installation detail.
 - b. Install wire with slack to allow for thermal expansion and contraction.
 - c. Expansion joints in wire to be provided at 200-foot intervals by making 5-6 turns of the wire around a piece of 1/2" pipe instead of slack.
 - d. Where necessary to run wire in a separate trench, provide a minimum cover of 18" as detailed.
 - 2. Provide sufficient slack at site connections at remote control valve in control boxes and at all wire splices to allow raising the valve bonnet or splice to the surface without disconnecting the wires when repair is required.
 - 3. Connect each remote-control valve to one station of a controller except as otherwise indicated.
 - 4. Connect each remote-control valve to a common ground wire system independent of all other controllers.
 - 5. Make wire connection to remote control electric valves and splices of wire in the field, using wire connectors and sealing cement in accordance with manufacturer's recommendations.
 - 6. Provide tight joints to prevent leakage of water and corrosion build-up on the joint.
 - 7. Wire splices shall only be made in accessible valve boxes.
 - 8. Utilize sleeves for installation of the irrigation system where indicated on drawings.
 - 9. Provide new sleeves for all locations where existing sleeves are not indicated. Install new sleeve prior to paving installation wherever possible.
 - 10. Remove and replace existing concrete and asphalt surfaces where cutting is necessary. Obtain District's and Architect's permission before cutting existing concrete and asphalt.
- E. Flushing, testing, and adjustment:
 - 1. After sprinkler piping and risers are installed and before sprinkler heads are installed, open control valves and flush out the system with full head of water.
 - 2. Perform system testing upon completion of each section. When the main line installation has been completed, pressurize to 125 pounds for a period of 6 hours. Inspector and Landscape Architect shall observe test. Make the necessary repair and re-test repaired sections as required.
 - 3. Adjust sprinklers after installation for proper and adequate distribution of the water over the coverage pattern. Adjust for the proper arc of coverage.
 - 4. Tighten nozzles on spray type sprinklers after installation. Adjust sprinkler adjusting screw on lateral line or circuit as required for proper radius. Interchange nozzles patterns as directed by the Landscape Architect, to give the best arc of coverage.
 - 5. Adjust all electric remote control valve pressure regulators and flow control stems for system balance and optimum performance.
 - 6. Test and demonstrate the controller by operating appropriate day, hour, and station selection features as required of each season per Service section below.

3.04 DISPOSAL OF WASTE MATERIAL

- A. Stockpile, haul form site, and legally dispose of waste materials, including unsuitable excavated materials, rock, trash, and debris.
- B. Maintain disposal route clear, clean, and free of debris.

3.05 ACCEPTANCE

- A. Test and demonstrate to the Landscape Architect and District satisfactory operation of the system free of leaks.
- B. Instruct the District 's designated personnel in the operation of the system, including adjustment of sprinklers, controller(s), valves, and flow sensing controls.
- C. Upon acceptance the District will assume operation of the system.
- D. All record documents must be approved and submitted prior to final payment per the General Conditions.

3.06 CLEANING

- A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, soil, debris, and equipment. Repair damage resulting from irrigation system installation.
- B. Extreme care shall be taken by the landscape contractor when backfilling of trenches. They shall be left flush with the existing surrounding soil level. Tamp soil and rake level to make level bed for turf to re-establish.

END OF SECTION 32 80 00

TREES, PLANTS AND GROUND COVER SECTION 32 93 00

PART 1 GENERAL INFORMATION

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1;
 - 2. Soil preparation;
 - 3. Trees, plants, and ground covers;
 - 4. Planting mixes;
 - 5. Mulch and planting accessories;
 - 6. Maintenance;
 - 7. Submittal preparation;
 - 8. Clean up.
- B. Related Sections:
 - 1. Section 32 80 00: Irrigation Systems

1.02 QUALITY ASSURANCE

- A. Plant names indicated shall comply with "Standardized Plant Names" as adopted by the latest edition of the American Joint Committee of Horticultural Nomenclature.
- B. Names of varieties not listed conform generally with names accepted by the nursery trade.
- C. Provide stock true to botanical name and legibly tagged.
- D. Comply with sizing and grading standards of the latest edition of "American Standard for Nursery Stock". A plant shall be measured as it stands in its natural position.
- E. All plants shall be nursery grown under climatic conditions similar to those in the locality of the project for a minimum of 2 years.
- F. Stock furnished shall be at least the minimum size indicated.
 - 1. Larger stock is acceptable, at no additional cost, providing that the larger plants will not be cut back to size indicated.
- G. Plants may be inspected and approved at the place of growth, for compliance with specification requirements for quality, size, and variety.
 - 1. Such approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of the work.
- H. Warranty:
 - 1. Warrant plant material to remain alive and be in healthy vigorous condition for a period of 1 year after completion and acceptance of entire project.
 - a. Inspection of plants will be made by the Landscape Architect at

completion of planting.

 Replace plants that are dead as determined by the Landscape Architect, or are in an unhealthy or unsightly condition, or have lost their natural shape due to dead branches, or other causes, at the Contractor's expense.
 a. Warrant all replacement plants for 1 year after installation.

1.03 PROJECT CONDITIONS

- A. Notify Landscape Architect at least 7 working days prior to installation of plant material.
- B. Protect existing utilities, paving, and other facilities from damage caused by landscape operations.
- C. In the event that quantity discrepancies or material omissions occur in the plant materials list shown on the drawings, the planting plans shall govern.
- D. The irrigation system will be installed prior to planting.
 - 1. Locate, protect, and maintain the irrigation system during planting operations.
 - 2. Repair irrigation components damaged during planting operation at the Contractor's expense.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide plants typical of their species or variety; with normal, densely developed branches and vigorous root systems.
 - 1. Provide only sound, healthy, vigorous plants free from defects, disfiguring knots, sunscald injuries, frost cracks, abrasions of the bark, plant diseases, insect eggs, borers, and all forms of infestation.
 - 2. Plants shall have a fully developed form without voids and open spaces.
 - a. Plants held in storage will be rejected if they show signs of growth during storage.
- B. Container-growth stock: Grown in a container for sufficient length of time for the root system to have developed to hold its soil together, firm, and whole.
 - 1. No plants shall be loose in the container.
 - a. Container stock shall not be pot bound.
- C. Provide tree species that mature at heights over 25'-0' with a single trunk. Trees that have the main trunk forming a "Y" shape are not acceptable.
- D. Plants planted in rows shall be matched in form.
- E. Plants larger than those specified in the plant list may be used when acceptable to the Landscape Architect.
- F. The height of the trees, measured from the crown of the roots to the top of the branch, shall not be less than Industry standard for each plant species and variety.

- G. No pruning wounds shall be present with a diameter of more than 1" and such wounds must show vigorous bark on all edges.
 - 1. Evergreen trees shall be branched to the ground.
- H. Shrubs and small plants shall meet the requirements for the industry standard spread and height for said species and variety.
 - 1. The measurement for the height shall be taken from the ground level to the average height of the plant and not the longest branch.
 - 2. Single-stemmed or thin plants will not be accepted.
 - 3. Side branches shall be generous, well-twigged, and the plant as a whole well-bushed to the ground.
 - 4. Plants shall be in a moist, vigorous condition, free from dead wood, bruises, or other root or branch injuries.
- I. Replace plant materials found dead or not in a healthy growing condition.
 - 1. Plants that die or lose more than 30% of their original leaves shall be replaced under this Section.
 - 2. Replace plant materials of same size and species, with a new warranty commencing on date of replacement.
- J. Trees, Plants, and Ground Cover shall be species and size-identified in plant schedule, grown in climatic conditions similar to close locality of the work.
- K. Plants shall be symmetrical, typical for variety and species, sound, healthy, vigorous, free from plant disease, insect pests or their eggs, excessive abrasions or other objectionable disfigurements, and shall have healthy, normal root systems, well filling their containers, but not to the point of being root bound. Tree trunks shall be sturdy and well hardened off.
- L. Substitutions for the indicated plant materials will be permitted.
 - 1. Provided the substitute materials are approved in advance by the Landscape Architect and the substitutions are made at no additional cost to the Owner.
 - 2. Except for the variations so authorized, all substitute plant materials shall conform to the requirements of these specifications.
 - 3. If accepted, substitute materials are of less value than those indicated or specified, the Contract price will be adjusted in accordance with the provisions of the Contract.
- M. Plant Inspection and Rejection: Root condition of plants will be determined by the Landscape Architect through the removal of earth from the roots of at least two (2) plants but not more than 2% of the total number of species from each source.

2.02 SOIL AMENDMENTS

- A. Areas to be planted and irrigated shall receive soil amendments.
 - 1. The following soil amendments shall be incorporated into the soil prior to planting.
 - a. Four (4) cubic yards compost shall be incorporated per 1000 sq. ft. of

soil surface area and rotor-tilled to depth of 6".

- b. Live Earth Liquid 6%- Drench at 32 oz. per 1000 sq. ft
- c. Humate soil conditioner @ 500 lbs per 1000 sq. ft. spread evenly after tilling, grading, and before planting.
- d. Live Earth Iron 10 (5-0-0) product @ 15 lbs per 1000 sq ft.
- 2. A copy of delivery slips on all materials used on the project shall be delivered to the authorized District representative at time of material delivery to site. Delivery will not be allowed without delivery slips on any items.
- 3. If import soil is to be used, a soil suitability and fertility analysis of the soil shall be conducted by a soils laboratory. Submit test results and recommendations for soil amendment to the Landscape Architect for review. If recommendations for soil amendment according to test results exceed the above quantities, the Contractor will be reimbursed for an extra based on unit costs submitted with original bid for soil amendments required in any of the above quantities.

PART 3 EXECUTION

3.01 PREPARATION

- A. Remove foreign materials, plants, roots, stones, and debris from areas to be planted.
 - At time of planting, areas to be planted shall be free of stones, stumps, roots, or other deleterious matter 1" in diameter or larger and shall be free from all wire, plaster, or similar objects that would be a hindrance to planting or maintenance.
- B. Protect existing underground improvements from damage.
- C. Any and all contaminated soil shall be removed and replaced with acceptable fertile import soil as determined by soils analysis.
- D. Cultivate all planting areas by ripping to depth of 12 inches with an agricultural implement designed for that purpose. Rip area in two directions, perpendicular to each other.
 - 1. Repeat cultivation areas where equipment has compacted subgrade.
- E. Excavate circular plant pits with vertical sides, except for plants specifically indicated to be planted in beds.
 - 1. Provide plant pits twice the width of the diameter of the root system for all the trees and shrubs.
 - 2. Depth of pit shall accommodate the container root ball, such that the top of the root crown shall be 1" above finish grade.
 - 3. Scarify the bottom of the pit to a depth of 4".
 - 4. Remove excavated materials from the site.

3.02 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fertilizer materials in original, unopened, and undamaged containers, showing weight, analysis, and the name of manufacturer.
- B. Store in manner to prevent wetting and deterioration.
- C. Take precautions in preparing plants for moving.
 - 1. Spray deciduous plants in foliage with an approved "Anti-Desiccant" immediately after digging to prevent dehydration.
 - 2. Dig, pack, transport, and handle plants with care to ensure protection against injury.
 - 3. Inspection certificates required by law shall accompany each shipment invoice or order to stock and on arrive, the certificate shall be filed with the Landscape Architect.
 - 4. Protect plants from drying out.
 - a. If plants cannot be planted immediately upon delivery, properly protect them with oil, wet peat moss, or in manner acceptable to the Landscape Architect.
 - b. Water heel-in plantings daily.
 - 5. No plant shall be bound with rope or wire in a manner that could damage or break the branches.
- D. Cover plants transported on open vehicles with protective covering to prevent wind burn.
- E. Reject plants when ball of earth surrounding roots has been cracked or broken preparatory to or during planting.
- F. Provide dry, loose topsoil for planting bed mixes. Frozen or muddy topsoil is not acceptable.

3.03 INSTALLATION

- A. Planting shall be performed only by experienced workmen familiar with planting procedures under the supervision of a qualified supervisor.
- B. Locate plants as indicated or as approved in the field after staking by the Contractor.
 - 1. If obstructions are encountered that are not shown on the drawings, do not proceed with planting operations until alternate plant locations have been selected.
- C. Set plant material in the planting pit to proper grade alignment.
- D. Set plants upright, plumb, and faced to give the best appearance or relationship to each other or adjacent structure.
- E. Set plant material 1" above the finished grade.
- F. No filling will be permitted around trunks or stems.

- G. Backfill the pit with planting mixture.
 - 1. Do not use frozen or muddy mixtures for backfilling.
 - 2. Form a ring of soil around the edge of each planting pit to retain water.
 - 3. Backfill mix shall be equal parts of native soil and sand, plus the soil amendments indicates below.
 - 4. The Backfill mix blend to contain the following:
 - a. Humate Soil Conditioner 45% humic @ approx. 1lb or 2 cups per gallon container size.
 - b. 'Aquasmart Pro' moisture retention product at the following rates -
 - 36" box- 5 cups
 - 5 gallon- 1/3 cup
 - 1 gallon- 2 tablespoons
- H. Space ground cover plants in accordance with the plans.
 - 1. Adjust spacing as necessary to evenly fill planting bed with indicated quantity of plants.
- I. Mulching:
 - 1. Install 3" thick layer of decomposed granite mulch within all shrub beds, immediately after planting. Thoroughly water mulched areas. After watering, rake mulch to provide a uniform finished surface.
 - 2. Tree and shrub root crowns shall not be covered with mulch material.
- K. Tree Staking:
 - 1. Inspect trees for injury to trunks, evidence of insect infestation, and improper pruning before wrapping.
 - 2. Staking:
 - a. Stake all trees immediately after lawn seeding or sodding operations, and prior to acceptance.
 - 3. All work shall be subject to acceptability of the Landscape Architect.
- L. Pruning:
 - 1. Pruning branches of deciduous stock after planting to balance the loss of roots and preserve the natural character appropriate to the particular plant requirements.
 - a. In general, remove 1/4 to 1/3 of the leaf bearing buds. Proportion shall, in all cases be acceptable to the Landscape Architect. Remove or cut back broken, damaged, and non-symmetrical growth of new wood.
 - 2. Multiple Leader Plants: Preserve the leader that will best promote the symmetry of the plant.
 - a. Cut branches flush with the trunk or main branch, at a point beyond a lateral shoot or bud a distance of not less than 1/2 the diameter of the supporting branch.
 - 1) Make cut on an angle.
 - 3. Prune evergreens only to remove broken or damaged branches.

3.04 INSPECTION

A. Examine proposed planting areas and conditions of installation.

1. Do not start planting work until unsatisfactory conditions are corrected.

3.05 MAINTENANCE

- A. Planted and turf areas will be inspected at completion of installation and accepted to compliance with specified materials and installation requirements.
- B. After all work indicated on the drawings or herein specified has been completed, inspected, and approved by the Landscape Architect, the Contractor shall commence a ninety (90) day Maintenance Period.
 - 1. This ninety (90) day Maintenance Period shall occur within the specified project completion timeframe.

3.06 WORK IN PROGRESS

- A. Contractor shall continuously maintain areas included in the Contract during the progress of the work and until final acceptance of the work.
- B. During Maintenance Period the contractor shall maintain the site and this includes all mowing (at height approved by District), watering, reseeding, mulching, cultivating, spraying, and trimming necessary to bring the planted areas to a healthy growing condition, and any additional work needed to keep the areas neat, edged, and attractive.
 - 1. This shall be required on a weekly basis.
- C. During the maintenance period, the Contractor, at his own expense, shall replace any plant indicating weakness or the probability of dying.
- D. All basins around shrubs and trees shall be maintained at a four (4) inch depth throughout progress of the work, unless otherwise instructed by the District's authorized representative.
- E. Tree stakes that for any reason are damaged or rendered inadequate for support shall be repaired and restored to their original condition.
- F. Constant diligence shall be maintained for the advent of disease, insects, and/or rodent infestation, and proper preventative or control measures taken.
- G. All shrubs and trees shall be maintained in their natural shapes.
 - 1. Tall or scraggly branches shall be thinned out where necessary.
 - 2. In no case shall trees or shrubs be trimmed by heading or shearing.
 - 3. Any plants severely pruned in this manner shall be removed and replaced at the Contractor's expense.
- H. Tree and Shrub Liquid Program to be applied with the installed fertigation unit:
 - 1. Live earth Emerald Green- @ 5 gallons per acre, (12-16 oz per 1000 sq.ft.) (Apply in April and September as needed.
- I. Tree and Shrub Granular Program:
 - 1. Live Earth 8-2-4 Product @ 10 lbs per 1000 sq.ft. Apply twice annually.

- 2. Live Earth Humate Soil Conditioner @ 50 lbs per 1000 sq. ft. Apply in October.
- J. At completion of maintenance period, all areas included in the Contract shall be substantially clean and free of debris.
 - 1. All plant materials shall be alive, healthy, and free of infestations.
- K. The Contractor, at his expense, shall repair any erosions or slippage of soil caused by watering.

3.07 CLEAN UP

A. All walks, curbs, and gutter shall be kept clear of debris, mud, dust, and standing water by sweeping, mopping, or hosing down, as required to maintain cleanliness throughout.

3.08 NOTICE

- A. The Contractor, within fourteen (14) days of written notification by the District's authorized representative, shall remove and replace all guaranteed plant materials that for any reason fail to meet the requirements of the guarantee.
 - 1. All plant material replaced shall be guaranteed for the original period, starting from the date of replacement.
- B. Written Notice:
 - 1. At the end of the specified Maintenance Period, the Contractor shall present written notice to the District's authorized representative that he has completed the required maintenance, and upon acceptance by District, any further maintenance will be the responsibility of the District.

END OF SECTION 32 93 00

SUPPORT AND PROTECTION OF UTLITITES **SECTION 33 05 25**

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Specifications for maintenance, support and protection of existing underground utilities as indicated.
- B. Related Sections:
 - Earthwork
 - **General Plumbing Requirements**
 - Section 31 22 00
 Section 22 00 00
 Section 26 01 00 General Conditions of Electrical Work

1.02 DEFINITIONS

- A. Measurement: Maintenance, support and protection of existing utilities will be measured for payment by the lump-sum method, acceptably performed and completed.
- B. Payment: Maintenance, support and protection of existing utilities will be paid for at the Contract lump sum price, as indicated in the Bid Schedule of the Bid Form.

1.03 REQUIREMENTS

- A. Locate existing utilities from record drawings provided by the Owner or local authority having jurisdiction. Maintain existing utilities and protect from damage as necessary to satisfy the requirements of jurisdictional utility companies and related codes and regulations.
- B. Do not disconnect or shut down any part of the existing utilities and services, except by permission of authorities having jurisdiction. Submit schedule of estimated shut-down time in order to obtain such permission, and notify all interested parties, neighbors, utilities and local authority having jurisdiction, as required.
- C. Utilities to be removed shall not be removed until shut-down time can be kept to a minimum. Do not remove an existing line or service until the replacement line, crossover, or capping is ready to be performed.
- D. Provide shoring, underpinning and structural support for existing utility lines and structures that become suspended or otherwise unsupported because of adjacent excavation operations.

1.04 REQUIRED NOTIFICATIONS

- A. Underground utilities shall be marked for identification by the affected utility companies 72 hours prior to performing any excavation or other work close to any underground pipeline, conduit, duct or other structure. The Contractor shall notify the Engineer and utility owners before performing any such excavation work. Notify most affected utilities by calling Underground Services Alert (USA) at 1-800-642-2444. Contact utility owners not covere3d by USA, such as owners of non-pressurized sewer lines and Caltrans, by colling the affected utility owners directly.
- B. Protect active underground utilities from damage. If underground utilities are damaged in any way, notify the Engineer, and affected utilities immediately for corrective action.

1.05 RELOCATION OF EXISTING UTILITIES

A. It is anticipated that certain utilities will be relocated by affected utility companies prior to start of construction.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 33 33 13

TRENCHING AND BACKFILLING FOR UTLITITES SECTION 33 05 28

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Bedding and backfilling materials.
 - 3. Staking and grades.
 - 4. Existing Utilities.
 - 5. Trenching and excavating.
 - 6. Bedding and backfilling.
 - 7. Field quality control.

B. Related Sections:

- 1. Section 03 31 00: Structural Concrete Work
- 2. Division 22 00 00: General Plumbing Requirements
- 3. Division 26 00 00: General Conditions of Electrical Work
- 4. Section 31 22 00: Earthwork
- 5. Section 32 12 16: Asphaltic Concrete Paving
- 6. Section 32 13 13": Site Concrete Paving

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 1. ASTM C33 Standard Specification for Concrete Aggregates.
- B. California Code of Regulations (CCR)
 - 1. Title 8, Chapter 4, Construction Safety Orders.
- C. State of California, Department of Transportation (Caltrans):
 - 1. Standard Specifications, Sections 68, Engineering Fabrics.
 - 2. Office of Structure Construction, Trenching and Shoring Manual.

1.03 SUBMITTALS

- A. Refer to Section1 30 00 "Administrative Requirements" for submittal procedures.
- B. Submittals for trenches of five (5) feet or more in depth shall be submitted to the Engineer for review and approval.

1.04 REQUIRED NOTIFICATIONS

- A. This Section includes specifications for excavating, trenching and backfilling for utilities and related structures, as indicated, including underground piping for water supply, sanitary and storm sewerage piping, trackway and roadway site subsurface and drainage; underground electrical conduits and duct banks; and utility boxes, catch basins, manholes, inlets, pull boxes and vaults.
- B. Trenching and backfilling for utilities includes restoration of existing pavements, where applicable, to the conditions existing before the excavation. Conform with applicable requirements of Section 32 12 16 "Asphaltic Concrete Paving" and 32 13 13 "Site Concrete Paving".

1.05 REGULATORY REQURIEMENTS

- A. Regulatory requirements that govern the work of this Section include the following governing codes:
 - 1. California Code of Regulations (CCR):
 - a. Title 8, Chapter 4, Subchapter 4 "Construction Safety Orders"
 - b. Title 8, Chapter 4, Subchapter 19 "Trench Construction Safety Orders"
 1) Trench excavations of five (5) feet or more in depth.
 - c. Title 24, Part 2 "California Building Code", Chapter 33 "Safeguards During Construction" and Appendix 'J' "Grading".

1.06 **DEFINITIONS**

- A. Measurement: Maintenance, support and protection of existing utilities will be measured for payment by the lump-sum method, acceptably performed and completed.
- B. Payment: Maintenance, support and protection of existing utilities will be paid for at the Contract lump sum price, as indicated in the Bid Schedule of the Bid Form.

PART 2 PRODUCTS

2.01 BEDDING AND BACKFILLING MATERIALS

- A. Bedding:
 - Sand: Sand for bedding of pipe utility trenches shall be a clean and graded, washed sand all passing a No. 4 U. S. Standard sieve and conforming generally to ASTM C33 for fine aggregate. A finer sand may be used, if convenient, provided the sand is clean and does not contain deleterious substances more than the amounts specified in ASTM C33, Table 3.
 - a. Only sand will be permitted for bedding of concrete pipe, clay pipe and castiron pipe.

- 2. Pea Gravel: Clean and graded, washed river-run, ASTM C33, Size No. 7. Pea gravel may be used in trenches requiring additional drainage and for backfilling above the pipe's upper half (above the horizontal centerline).
- B. Backfill Material: Backfill for excavations and trenches under structures and paving shall be Structural Fill (as indicated). Refer to Section 31 22 00 "Earthwork" for requirements. Common Fill will be permitted only for backfilling of excavations and trenches in open areas and landscape areas.
- C. Slurry Cement Backfill Material: Slurry cement backfill shall consist of a fluid, workable mixture of Portland cement, clean and graded aggregate, and water.
- D. Filter Fabric Material: Geotextile engineering fabric conforming to Caltrans Standard Specifications, Section 68-2.02G, "Filter Fabric".

PART 3 EXECUTION

3.01 STAKING AND GRADES:

A. Refer to Section 31 22 00 "Earthwork" for requirements.

3.02 EXISTING UTILITIES

A. Refer to Section 31 22 00 "Earthwork", Section 33 05 25 "Support and Protection of Utilities" and for requirements.

3.03 TRENCHING AND EXCAVATING

- A. Comply with California Code of Regulations (CCR), Title 8 "Trench Construction Safety Orders" and Chapter 33 and Appendix J as applicable.
- B. Perform trenching and excavating as indicated and required for drainage and utility piping, conduits, and related structure, and provide shoring, bracing, pumping, and planking as required.
- C. Excavate to the lines and grades indicated.
- D. Excavate trenches for pipes and conduits by the open-cut method, except where tunneling or jacking are indicated. Hand-excavate for crossing pipelines.
- E. In paved areas, cut pavement on the neat lines at the width indicated for trench. Pavement shall be sawcut. After compacting the backfill, restore pavement to a condition equivalent to that existing at the start of construction. Restore pavement damaged outside the neat lines.
 - 1. Where indicated or required, by local agency having authority, provide slurry cement backfill for trench excavation to underside of pavement.

- F. Excavate trenches to the indicated width at all points below a horizontal plane two (2) feet above the top of the pipe. Excavation above this plane may exceed the indicated width as required. Where the width is not indicated, make the with not less than 6 inches nor more than 18 inches from the outside of the pipe. If the excavation exceeds permissible dimensions, install higher strength pipe or encase the pipe in Class 3000 concrete.
- G. The bottoms of excavations shall be firm, undisturbed earth or cut sub grade, clean and free from loose material, debris, and foreign matter. When bottoms of excavations or trenches are a soft or unstable material, the bed shall be made firm and solid by removing said unstable material to a sufficient depth and replacing same with sand or pea gravel, compacted to at least 90 percent relative compaction.
- H. Where water is encountered in the trench, remove the water, or provide sand or pea gravel as required to drain the water and stabilize the bed.
- I. Bell holes shall be accurately placed and shall not be larger than required to make the joint.
- J. Excavations for structures shall conform to applicable requirements of Section 31 22 00 "Earthwork".

3.04 BEDDING AND BACKFILLING

- A. Material for bedding of pipe shall be sand. Minimum thickness of sand bedding under concrete, clay and cast-iron pipe shall be 2 inches. Provide firm and uniform support of piping at indicated elevations and grades. Tamp sand bedding as required for firm support.
 - 1. The joints of gravity flow piping shall be wrapped with filter fabric all around the pipe. Place filter fabric before laying pipe in sand bedding. Filter fabric shall extend at least twelve (12) inches on each side of the joint.
- B. Backfill the horizontal centerline of pipe shall be sand. Backfill to six (6) inches above the top of pipe from the horizontal centerline of pipe shall be the material herein specified in Paragraph 2.01A.2 and 2.01.B, as applicable.
- C. Backfill shall be placed in six-inch (6") layers, leveled, rammed, and tamped in place. Each layer shall be compacted with suitable compaction equipment to at least 90 percent relative compaction, taking care not to damage or misalign any pipe. The top twelve inches (12") under structures and pavement shall be compacted to at least ninety-five percent (90%) relative compaction.
- D. Backfilling around concrete structures and for duct banks and similar utilities shall conform to the applicable requirements of Section 31 22 00 "Earthwork".

END OF SECTION 33 02 28

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Fairfax School District		FOR UTILTITIES

SANITARY UTILITY SEWERAGE SYSTEMS SECTION 33 33 13

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1;
 - 2. Excavation;
 - 3. Piping;
 - 4. Backfilling and compaction;
 - 5. Concrete manholes; catch basins, boxes, and lids;
 - 6. Accessories and associated hardware;
 - 7. Submittal preparation;
 - 8. Clean up.
- B. Related Sections:
 - 1. Section 22 00 00: Plumbing
 - 2. Section 31 22 00: Earthwork

1.02 REFERENCES

- A. ASTM International (ASTM)
 - 1. ASTM C76 Standard Specification for Reinforced Concrete.
 - 2. ASTM D520 Standard Specification for Zinc Dust Pigment.
 - 3. ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³).
 - 4. ASTM D2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
 - 5. ASTM D3034 Standard Specification for Type PSM Poly (Vinyl Chloride) Sewer Pipe and Fittings.
 - 6. ASTM F477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product or Material Data:
 - 1. Submit copies of manufacturer's technical product data and installation instructions prior to beginning fabrication.
- C. Shop Drawings or Layout Drawings:
 - 1. Submit copies of shop drawings to the Architect for review prior to beginning fabrication.

- D. Close-Out Submittals:
 - 1. Update Project record documents on a regular basis and at the completion of work, review and sign the project record documents attesting to their accuracy.
 - a. Include exact locations of storm drain piping, invert elevations, and top-ofgrate elevations.

1.04 QUALITY ASSURANCE

- A. Warranty:
 - 1. As required by the General Conditions.

PART 2 PRODUCTS

2.01 MATERIALS

- A. For pipe diameters of 18 inches or larger Reinforced Concrete Pipe.
 - 1. Comply with ASTM C76, Class II, unless noted otherwise.
 - 2. Use rubber gasket joints per ASTM F477.
- B. For pipe diameters less than 18 inches PVC Pipe.
 - 1. Use SDR 35 per ASTM D3034.
 - 2. Use rubber gasket joints per ASTM F477.
- C. HDPE piping will not be allowed.

2.02 ACCESSORIES OR HARDWARE

- A. Precast Concrete Catch Basins:
 - 1. Include galvanized metal frames, covers, and grating from the same manufacturer.
 - a. Catch Basin shall have cast-in galvanized frame for bolt-down grate provision.
 - b. Grates shall be ADA-compliant when located in site concrete areas.
 - 1) Grid openings in gratings shall be limited to 1/2 inch in the direction of traffic flow.
 - a) Elongated openings shall be placed so that the long dimension is perpendicular to the dominant direction of travel. Alternate direction of grate openings in plazas, courts, and other wide pedestrian areas.
 - c. Grates shall be vandal proof.
 - 1) Grates shall be galvanized steel and bolted down.
 - 2. Approved Manufacturers:
 - a. Old Castle, Infrastructure;
 - b. Or approved equal.
- B. Fittings and accessories shall be of the same materials and weight/class as pipes

- C. Manufactured saddle wyes may be used in lieu of inline wyes.
- D. Galvanized Finish Repair.
 - Repair compound: ASTM D 520, Type III high purity grade zinc dust. 24lbs/gallon minimum weight per gallon. 52% by volume minimum solids content. 94% by weight in dry film minimum metallic zinc content. Galvilite Galvanizing Repair, ZRC Worldwide. (800) 831-3275.
 - 2. RotoMetals Regalv lead free galvanizing repair stick. heat applied.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify layout prior to beginning work.
- B. Start of work shall be considered as acceptance of existing conditions.
- C. Inspect pipe prior to installation.
 - 1. Defective materials shall be marked as such and promptly removed from site.

3.02 INSTALLATION OR APPLICATION

- A. Install in compliance with ASTM D2321.
- B. Install in compliance with governing authorities.
- C. Install per the manufacturer's latest written recommendations.
 - 1. Lay pipe beginning at low point of system.
 - 2. Place bell and groove ends of piping upstream.
 - 3. Install waterstop gaskets for plastic to concrete interfaces.
 - 4. Install storm drain leads to roof downspouts to within five (5) feet of the downspout location.
 - a. Cap for future connection.
 - b. Verify location with Architectural Drawings.
- D. Tap Connections:
 - 1. Install tap connections to existing piping and underground structures to conform as nearly as possible to the requirements for new construction.
 - 2. Tap roof drains into larger diameter storm drain lines using manufacturer's fittings for wyes and saddles.
- E. Backfilling:
 - 1. Backfill after inspection of piping. Storm sewer piping with rubber gasket joints will not require pressure testing.

- 2. Backfill piping with vibrated sand to 12" above the top of pipe.
 - a. Compact to 90% of maximum density per ASTM D1557 for non-cohesive materials
- 3. Backfill remainder of trench with native soils compacted to 90% per ASTM D1557, unless noted otherwise.
 - a. Top six inches below paved areas shall be compacted to 95% per ASTM D1557.

3.03 QUALITY CONTROL

- A. Field Inspection:
 - 1. Inspect piping to determine that line displacement or other damage has not occurred.
 - a. Inspect after two (2) foot of cover has been installed and compacted.
 - b. Correct any defects.
 - 2. Verify that piping, catch basins, boxes, and accessories are installed true-toline, and at elevations indicated on the Drawings.

3.04 CLEANING OR REPAIR

- A. Clear interior of piping of dirt and other materials.
 - 1. Pull swab past each joint as it is completed.
 - 2. Place plugs in the ends of uncompleted piping at the end of each work session.
 - 3. Flush lines between manholes and catch basins to remove debris.
 - 4. Repair all damaged galvanized material with approved/specified repair material. Manufacturer's requirements for prep and application shall be strictly followed.

3.05 CONDITION OF FINISHED WORK

- A. The completed installation shall be clean, true to line and grade, and accurately set to elevation.
- B. Backfill shall be compacted.
- C. Rake out dirt over trench locations to blend smooth and level with adjacent areas:
 - 1. Dirt clods shall be a maximum of 1/2" in size;
 - 2. Surface rocks greater than 1/2" shall be removed;
 - 3. Leave dirt areas acceptable for turf planting.

END OF SECTION 33 33 13